Mechanical Safety Introduction

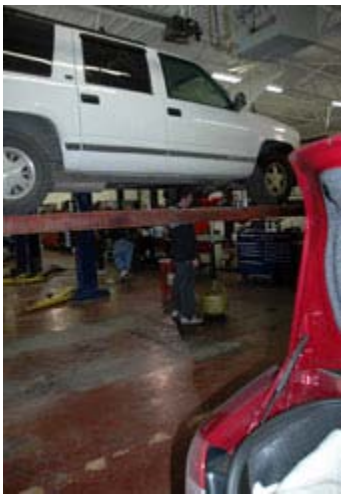
Learning Objectives:

- Define the expectations for the course.
- Understand why the government cares about safety.
- Recognize how your actions affect you AND your co-workers.

Training Content Provided by

S/P2 Safety and Pollution Prevention

Introduction



No one wants to be hurt on the job, nor do they want others to be hurt. In an effort to prevent job-related injuries or death, federal laws require businesses and schools to train their employees and students on safety and pollution prevention issues. That training is the purpose and reason for our course.

This course contains several modules, each one addressing a different topic. Each is different in length and, for most people, each can be read relatively quickly. The modules discuss safety and pollution prevention practices that are important in your industry. At the beginning of each are objectives outlining what will be learned in that module. You may leave and return to a module at any time. After reading all the modules, you will take a final exam that will test your knowledge of the materials.

For the final exam:

- Read all modules before taking the final
- You must correctly answer 80 percent of the questions to pass
- You will have five attempts to pass the course
- After passing the final, you can print a certificate of completion

Mechanical Repair and Safety

The CCAR Safety Training is designed to provide information that will protect you *immediately* upon entering the shop environment. Many safety training programs start with the paperwork issues and then try to address every possible injury that could occur, many of which may be unlikely or highly improbable.

Although we will talk about paperwork and legal issues in the Supervisor's Training, our feeling is that technicians need to know *what to do* and *how to protect themselves* in the shop environment, which is after all, where the accidents are most likely to occur. Although entry-level workers in particular tend to have a much higher risk of injury in a shop environment, our goal is to create an *awareness of personal and industrial safety* among employees of *all levels of experienc*e in order to better protect individuals working in the automotive repair industry.

Mechanical Repair and Safety (Continued)

Beyond just awareness of the causes and prevention of workplace injury, however, it is important that you realize that *federal law requires safety training before workers or students enter the work area*. This is specifically laid out in *OSHA 29CFR 1910.1200(h)(1)* and *The OSHA Act of 1970*.

CCAR asks that you not only raise your level of awareness of the dangers as they relate health and well being; we ask you to watch out for others in your work environment. If something appears dangerous, don't walk past it! If a co-worker is doing something that could harm them, stop and in the kindest and most direct manner possible, explain that the method they are using isn't the best...and you don't want to see them hurt.

Safety Training and Safety Mentoring

If you have been around car and truck repair for any time at all, the odds are good that have been injured in some way, especially early on in your career. When you hurt yourself, you learn not to take the same action again, and you become aware of a hazard.

This course is designed to teach you what to do or not do, and will deal with the types of injuries that you might see most frequently in an automotive repair facility. Our hope is that you take injury and illness prevention seriously. With the information in this course, you should be able to avoid problems and adequately protect yourself.

keep in mind

If you need additional information on workplace injuries, their causes, and their prevention, check out any of the following Web sites:

CCAR-GreenLink - www.ccar-greenlink.org
EPA - www.epa.gov
OSHA - www.osha.gov

Meeting for Safety

The more a shop and its employees meet to review safety, health and environmental issues, the less likely it is that someone is going to be injured or have a long-term health issue; and yet, some technicians feel as if safety meetings just repeat things over and over. Some shrug safety off, and they tend to be the ones who have accidents. They are the ones who are likely to say, "I don't need to go to any more meetings. Isn't it all just common sense anyway?"

Common Sense Isn't So Common

Life is full of scenarios that should have been governed by common sense. How many smokers die of lung cancer every year, even though the evidence that smoking causes cancer is irrefutable? How many people die on our highways, when just buckling up could have saved them?
Here are a few examples of accident-causing scenarios that have occurred in the workplace. One might think common sense should have prevented them, and yet these types of accidents have happened more than once in shops around the country and resulted in major injuries and even deaths!

- Looking into a gas tank to see if it's full, and then using a cigarette lighter for illumination
- Not having a full fire extinguisher nearby while welding
- Not having the exit doors marked
- Blocking exit doors during a fire

How Could This Happen?"

When accidents like the ones just mentioned occur, you may hear a variety of comments like "You would think people would know better. After all, isn't it just common sense."

keep in mind

Common sense is not enough! Without attention being given to safety issues, *accidents will happen and the results may be devastating*. Workplace safety requires much more than common sense; it requires:

An awareness of the risks
A plan to address those risks
Training to help employees avoid needless risk
An ongoing commitment to safety

Unwillingness to focus attention on safety matters can result in disaster, as the example on the next page will illustrate.

One Hundred Forty-Six Workers Killed in Fire

In the 1920s, at the Triangle Shirtwaist Factory in Boston, hundreds of women were locked in the plant to keep them from taking breaks or having contact with anyone outside the factory. The exits were blocked with boxes and hard-locked. When a fire broke out, *146 women burned to death*.

Common sense tells us that people shouldn't have been locked in and fire exits shouldn't have been blocked. Yet, because the safety of employees was not given proper consideration, people died. This tragedy brought to light the dangerous conditions in which some companies had placed their employees. Since that time, the government has developed rules and regulations to prevent tragedies like this.

The Government and Safety Attitudes

The United States government, over the years, has seen thousands of accidents occur in all kinds of industries. As a result, in 1971, the federal government created the Occupational Safety and Health Administration to *both assist and require* employers and employees to make the prevention of "on the job" injuries and work-related illnesses a priority.

OSHA has very specific guidelines for a variety of different industries, including the automotive repair industry. It is safe to say that OSHA's efforts have probably saved thousands of workers from serious injury or death. To learn more specific information about OSHA, consult the OSHA Web site at *www.osha.gov*

Most Common Accidents, Injuries and Health Issues

In the modules to follow, you will learn about the most common reasons for work-related accidents, injuries and health-related issues. By paying attention to and using the information included, you will be able to avoid the *pain, inconvenience and loss of time and money caused by such accidents* and illnesses.

Do your job correctly...the safe way. Make safety a habit, and then share your own safe attitude and habits with your co-workers. This is important for their safety and your own. Remember, their actions also affect you!

Mechanical Safety Course Modules

Here are the subject modules of the Mechanical Safety course:

- Avoiding Injury in the Workplace
- Respirators/Air Quality
- Fires
- Electrical
- Slips and Falls
- Power Tools
- Lifts
- Welding
- Blood-borne Pathogens
- Operating Vehicles
- Jump Starting
- Violence in the Workplace
- Chemicals and MSDS

Following these modules is the Final Exam. There are 38 questions in the exam, and the passing score is 80%.

Optional Modules

Three optional modules are also available for you to review as part of the Mechanical Safety course:

Lockout/Tagout
Confined Spaces
Forklifts

Each of the optional modules ends with a quiz, but these subjects are not included in the Mechanical Safety course Final Exam.

Summary

Safety is everyone's responsibility. The federal government can mandate it, employers can do their best to train the employees in their shop, but ultimately, the responsibility for safety will fall on the shoulders of each individual in the workplace. Do your work safely, and look out for fellow employees.

Click to Take Exam

Mechanical Safety Introduction Avoiding Injury in the Workplace

Learning Objectives:

- Understand the possible causes and consequences of workplace injuries.
- Identify ways to prevent workplace injuries.
- Recognize the parts of the body most susceptible to injury.

Training Content Provided by

S/P2 Safety and Pollution Prevention

Introduction

As someone who works in the automotive industry, you are no doubt aware of some of the opportunities for accidents and injuries that exist within the workplace. What you may find surprising, however, is the staggering number of injuries that occur in the workplace as a whole.

facts and stats

According to a recent Survey of Occupational Injuries and Illnesses by the Bureau of Labor Statistics within the Department of Labor more than *4.3 million nonfatal workplace injuries and illnesses are reported annually*.

Every day, you work with things that are *sharp*, *loud*, *heavy* and *hot*. That's just a fact of life when you work with motor vehicles. Just because there is risk, however, doesn't necessarily mean that injury has to follow. By *having a clear understanding of the types of injuries that can occur and what can be done to avoid them*, the risks can be minimized substantially.

The Five Key Areas at Risk

Realistically speaking, any part of your body has the potential for injury. There are, however, areas where injuries are more likely to occur. They include:

- Back
- Hands
- Eyes
- Ears
- Feet

We will focus our attention in this course on each of these body parts that are at greatest risk. We will then discuss both what those *inherent risks are* and the *ways in which these injuries can be avoided*.

Back Pain - More Common Than You Think

Of all the various types of injuries that occur in the workplace, back injury is one of the most significant. If you have never had problems with your back, consider yourself fortunate.

At some point in their lives, *over 66 percent of all Americans will experience some type of back pain*. Back pain can prevent a person from working, costing them income and costing their employer business productivity. Each year, *about 2 percent of the American workforce is compensated for disabilities caused by back pain*

Anatomy of the Back - A Grand Design

Like the motor vehicles you work with, our backs are an amazing feat of engineering, made up of a combination of:

- Bones
- Ligaments
- Tendons
- Muscles
- Nerves

Although any part of the back is susceptible to injury from causes as diverse as trauma, disease, injury or birth defect, the most common area for work-related back problems is the lower, or lumbar portion.

The lumbar region basically serves as the *hinge* between the upper and lower parts of the body. In this capacity, it is more likely to be injured in the process of *reaching*, *twisting*, and particularly, *lifting*.

Nagging Type of Injury

What makes back injuries particularly difficult is they are *slow to heal*. When describing back injuries, doctors tend to talk in terms of several different categories:

- Acute - lasting less than three months; most people gain relief after a period of somewhere between four to six weeks
- Recurrent - basically just a repeat of an acute episode; most people will tend to have at least one episode of recurrent back pain
- Chronic - lasting more than three months

Imagine trying to do your job, with all the bending and twisting that's involved, with this type of lingering pain! Clearly, injuring your back is something you will want to avoid. With that being the case, why is it that so many people suffer some type of back injury?

Avoiding Injury on the Job

There are many reasons why people injure their backs on the job, but among the most prevalent are:

- Lifting too much weight
- Pushing/pulling too much weight
- Not getting help to lift or move something heavy or awkward
- Bending over too far and lifting with the back instead of squatting and lifting with the legs
- Lifting while off balance
- Twisting with a load

Examine this list closely and you will quickly realize that, in all probability, you have engaged in one or more of these activities yourself! Clearly, more attention needs to be focused on avoiding these at risk behaviors.

There is No Fountain of Youth

When we were kids playing in the schoolyard, our bodies were extremely flexible. It seemed as if we could bend like pretzels; when we fell down, we bounced back up like rubber balls! We were able to lift, push, pull, run, jump and fall down, and yet never seemed to suffer any significant consequences. Wouldn't it be great if our bodies could stay like that forever?

Unfortunately, there is no fountain of youth. And so, as we've grown older and entered into the work force:

- We typically aren't getting the same amount of exercise as we did in our youth
- We don't use our various muscles as much
- We don't stretch as much as we should

This combination of becoming adults and *getting less exercise*, coupled with *not using proper lifting technique*, can set the stage for a back injury to occur.

Proper Lifting Technique

Most workplace lower back injuries are a result of lifting items improperly, so remember this:

keep in mind

The primary means of avoiding injury to your back is to employ proper lifting techniques.

Have you ever watched weightlifting competitions on TV? Despite their strength and the long hours they spend in the gym, these amazing athletes in pursuit of their medals are no different from you and me: Like them, we must use proper lifting techniques to avoid serious injury.

Even though most of us will never compete for Olympic gold, all of us at some point in our career are probably going to lift something that, if we are not using proper technique, could cause injury to our backs.

Proper Lifting Technique (Continued)

The way to properly lift an item is:

- Stand close to the item with both feet firmly on the floor about shoulder width apart. Point your toes out.
- Squat down close to the item with your back straight, knees bent and stomach muscles tight.
- Grip the item firmly with both hands, not just the fingers.
- Lift and stand up slowly, keeping your back straight and letting your legs do the lifting.
- If you have to change direction while you're carrying an item, *don't twist your body*. Twisting is a major cause of back injuries. To change direction, *move your whole body by moving your feet*.

While there are no guarantees, your chances of avoiding a nagging injury that could cost significant time off of work are greatly enhanced by using these methods.

Make them a habit, regardless of the weight of the items you might need to lift. You may think something is light enough to just bend over and pick up, but keep in mind that looks can be deceiving. Also, even a weight that you might normally lift with ease can create problems if your back is tight and not properly stretched out.

Putting Things Down

It's no less important to use proper technique when putting an item down. When you get where you're going, here's what to do to avoid injury:

- Lower the item slowly, bending your knees so your legs do the work
- Keep your back straight
- Position your hands so your fingers don't get caught under the load
- Place the load on the edge of the surface and slide it back

Don't Lift if You Don't Have to

Sometimes in the work environment, our pride and self-image make us want to show people how tough we are. When it comes to lifting heavy things, it's much smarter to put our egos aside and use the lifts, slings, dollies, two wheelers and all kinds of other tools we find at our disposal that are designed to help us lift and carry heavy objects. Also, don't be afraid to ask someone else for help. In the long run, you and your back will be much better off.

Now, let's move on to the type of injury most common in automotive repair facilities.

Eye Injuries

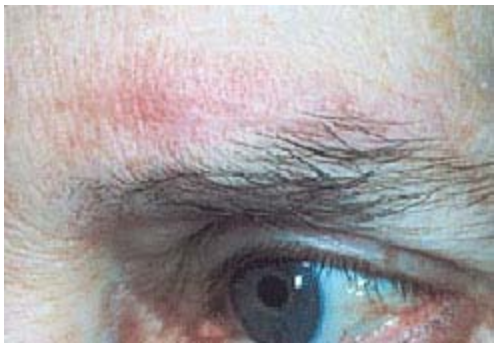
Imagine not being able to clearly see the face of your best friend, spouse or children. It's a disturbing thought. With that in mind, realize that, regardless of what kind of position you hold within the auto repair industry, injuries to the eyes are a very real possibility. They usually occur as a result of the following things:

- Falling Debris - When a car is on a lift or a person slides under a car to work, they are looking up at the car. They shake something, pry on something, turn a wheel, rotate the drive shaft or shift the front wheels right and left. In the process, a chunk of dirt or road debris can be easily jarred loose and falls directly into their eye. The good news is that this injury is very preventable by simply wearing protective eyewear.

Once debris is in the eye, the employee should first try to wash it out with an eye wash machine or flood the eye with water at a sink. If the debris has cut the eye, even slightly, or remains stuck in the eye, a trip to the emergency room is necessary.

Eye Injuries (Continued)

Below are more potential causes for eye injuries:



- Flying Debris - A technician using a bench grinder, a high speed drill, rotary tool or wire brush can have a piece of debris fly or ricochet into the eye. Car detailers can also get blowback by using air nozzles to blow out interiors. This is especially dangerous for those workers in mechanical shops when cleaning glass shards from a broken windshield, which can be lying unseen in the interior or air conditioning ducts. Once again, these injuries could be prevented 99 percent of the time by wearing protective eyewear. As with falling debris, if the eye is cut or the debris is stuck in the eye, a trip to the hospital is probably going to be necessary.
- **E**lectric Welding Arc - These injuries are not as common, but it should be stated that no one should look at a welder arc without eye protection. The sensation would almost be like looking directly into the sun.

Eye Injuries (Continued)

Below are more potential causes for eye injuries:

- **Battery Explosion** - Hydrogen gases build up in the common car battery and old batteries can get cracks in the case or around the posts. When using jumper cables on a car battery, sparks can fly at the post. Any amount of hydrogen escaping is capable of igniting immediately. The tops of many batteries have blown upward right into the face of a technician. The effects of battery acid to your eyes would be devastating.
- **During Machine Inspection** - While leaning over a running engine, the air being pulled through the radiator can loosen a tiny particle in the engine compartment or a tiny piece of fan belt can choose exactly that moment to dislodge. Also, though remote, there is the chance that a radiator hose could burst or cap unseat and hot antifreeze spray upward, damaging the eye. Once again, the potential for serious injury to the eye is preventable if you are wearing protective eyewear.

The Importance of Safety Glasses

In addition to the pain of injury, there are a number of costs incurred:

- The costs in medical bills*
- The costs in time off *
- The resulting rate increases in insurance that occur

All of this occurs because even some of the most well-intentioned workers don't take the time to pick up a pair of safety glasses! Not all glasses are approved for the work you do, so check with a supervisor before you begin any work.

The law says employers must make sure that employees have the right protective eye wear and that they know how and when to use it, so there is no excuse not to do the right thing.

did you know?

Eye injuries are one of the most common and preventable type of work-related injury in the automotive industry. Protect yourself and always wear protective eyewear. * The average eye injury costs nearly $4,000, including time off and medical bills.

Your Job is Hands On

No matter what type of job you do in automotive repair, imagine trying to do it without the use of one or both of your hands! Hand injuries are the second most frequent injury in the automotive repair industry, and account for the largest number of lost days. Twenty percent of injuries resulting in lost days are related to fingers, hands and wrists.

If you have ever slipped a wrench off a bolt in a tight space and skinned your knuckles, you know the pain can be intense, but it's probably not serious. Listed below are just a few examples of the many ways people can seriously injure their hands in the automotive industry:

- Broken hands from slipping wrenches
- Cuts from sharp sheet metal, cotter pins, etc.
- Pinches from pliers, metal parts fitting together
- Doors and hoods being slammed
- Burns from hot motors and exhausts

Regardless of the cause, the good news is there are measures we can take to either minimize, or in most cases, eliminate the injuries completely.

The Doctor's Example

Most of us have watched a doctor, either in a fictional TV program or in a documentary format, perform some type of surgery. What is one of the first things they do before they even begin to make an incision? *They put on gloves*.

Although they are doing some of the most delicate and precise manual work imaginable, they still put on sterile gloves. The reason for those gloves is to *protect their patients and themselves* from infection and disease.

keep in mind

Follow the surgeon's example and *put on protective gloves before you begin your work*. Remember, your hands are your most important tool!

It All Goes Together Like "Hand in Glove"

The government has found that many injuries would never happen if a person put on equipment proven to protect them. By wearing the correct protective equipment, cuts, scrapes and burns can usually be avoided. There are a variety of different types of gloves that may be used to protect your hands. It's important that the type you choose be dictated by the kind of work you will be doing.

- Heavy Cotton or Leather - These types of gloves are best used in situations where the primary risk to your hands would be:
    - Cuts
    - Lacerations
    - Punctures
    - Abrasions
    - Pinches
    - Thermal burns
- PVC dot-tipped - These are the gloves that have what appear to be small plastic dots on them. This type of glove is best used when dealing with an item, like glass for example, where the risk of it slipping out of your hands is significant.

Long-Term Problems - Hazards That are Not So Obvious

Long-term problems can be worse than the instant pain of a cut that sends you to the emergency room for stitches. Putting your hands into *chemicals that can be absorbed through skin* is a hazard you can't see as it happens. Every day you work around chemicals that can come in contact with hands (as well as skin, eyes, clothes, etc.). Some of these chemicals are known to cause illnesses in some people after certain amounts of exposure.

There are protective gloves such as the new nitrile gloves (similar to those that surgeons wear!) that offer excellent protection. Wear the right type of protective gloves and the chemicals won't come in contact with your hands!

Your hands are the primary body parts that come into contact with chemicals, but not the only place. If the warning labels on the material safety data sheet (to be addressed further on in your S/P2 training) information says the chemical is hazardous, then *don't let it come in contact with your skin or your clothes*. If it does, change uniforms and wash it off.

Risks and the Gloves to Protect Against Them

keep in mind

The table below can be helpful to you in matching the type of glove to the job being done:

Common Risk Area	RiskType	Type of Glove
Hot Metal, Engine, Exhaust	Immediate Injury	Leather/Heavy Cotton
Sharp Metal, Sheet Metal	Immediate Injury	Leather/Heavy Cotton
Glass Handling	Immediate Injury	Leather/Heavy Cotton PVC Dot-Tipped
Welding	Immediate Injury	Leather/Cotton Flame Resistant
New Oil or Antifreeze	Varies	None or Nitrile/Latex
Used Oil or Antifreeze	Long Term	Nitrile or Latex
Degreasing Solvents	Long Term	Nitrile
Thinners/Paint Solvents	Long Term	Nitrile
Blood	Long Term	Nitrile

The Sound of Music

We've already addressed the vision issue. Now, imagine for just a moment not being able to hear your favorite song or the voices of your children. We are talking about an issue that you just can't put a price tag on!

What makes hearing loss so devastating is that by the time you realize something is happening, *it's usually too late to do anything about it*. Plus, when you experience hearing loss, the damage is irreversible. The best you can hope to do is to use hearing aids to compensate for it. The only way to avoid this is to be proactive and wear ear protectors. Ear protectors filter out the damaging noise while still allowing you to hear people talking to you.

Regardless of what kind of work you do in the automotive repair industry, you will be working in an environment where it can at times get extremely noisy. How do you know if you need to wear ear protectors?

If you are in an environment (operating power tools, working around running engines, etc.) where you can't hear what a co-worker is saying without them significantly raising their voice, then ear protection should be used.
If you are experiencing any difficulty hearing high-pitched sounds, you may have already experienced some hearing loss.

Types of Hearing Protection

There are several different options available for protection of your hearing:

- *Expandable foam plugs* - made from a flexible material that will expand and conform to the shape of your ear.
- *Pre-molded reusable plugs* - made from silicone, plastic, or rubber and available usually in both a one-size-fits-all variety or a choice of sizes. They are inexpensive, washable, and convenient to carry.
- *Canal Caps* - resemble ear plugs on a flexible plastic or metal band. They can hang by the band from the neck when not in use, making them convenient to use.
- *Earmuffs* - they block out noise by covering the entire ear. They are very effective, but can be hot, cumbersome and somewhat heavy in certain environments.

Comfort, fit and effectiveness in reducing noise are the primary factors to consider when choosing what type of ear protection to use.

Putting Your Best Foot Forward

For most of us, when we think of footwear, we have one of two things in mind:

- Comfort
- Style

The last thing that is usually on our mind is whether our feet are *properly protected*. In some environments that kind of mindset can lead to very negative consequences. In an office, for example, it may be at the very least a stubbed toe. Working in an automotive repair environment, however, raises the stakes considerably.

You are constantly working around things that are sharp, hot and heavy. Step on sharp metal, and you may not have enough protection in the sole of your shoe to prevent penetration into the sole of your foot. Drop something heavy, and without reinforced toes in your shoes, you're probably looking at a broken bone.

Comfort is important, but we suggest you forgo the issue of style and focus your attention on *protection*.

Getting Where You Want to Go

When it comes to getting from point A to point B, most of us probably think of driving in our cars. The truth is, most of our transportation comes courtesy of our two feet. Think about all the walking you do during the course of a single day in your shop. If you hurt or injure a foot, it's guaranteed that you will give a great deal of thought to the amount of walking you do!

If you are at risk of any of the following, you need to give serious consideration to investing in protective footwear.

- Heavy objects falling on or rolling over your feet
- Sharp objects piercing your shoe
- Exposure to corrosive agents
- Exposure to electricity

What is Protective Footwear?

Typically, good protective footwear is a sturdy shoe or boot (over the ankle is recommended) made of leather, rubber or a synthetic material. Good protective shoes have an impact-resistant toe and non-skid soles with rubber or synthetic treads to prevent slips and falls.

The American National Standard for safety-toe footwear referred to in the Occupational Safety and Health Administration standard deals with the strength of the "toe box." The top classification (75) will withstand the impact of 75 pounds per square inch falling on your foot.

OSHA has very specific requirements regarding protective footwear. OSHA has a regulation on foot protection (29 CFR 1910.136) which states:

"*Each affected employee shall wear protective footwear when working in areas where there is a danger of foot injuries due to falling or rolling objects, or objects piercing the sole, and where such employee's feet are exposed to electrical hazards.*"

Protective footwear purchased before July 5, 1994 shall comply with the ANSI standard "USA Standard for Safety-Toe Footwear," Z41.1-1967. Protective footwear purchased after July 1994 shall comply with ANSI (American National Standards Institute) Z41-1991.

Specific Information for Your Area

To our knowledge, federal laws and guidelines are all that currently apply in your state. If you are aware of any other state laws or regulations not included in this training, please notify CCAR immediately (888.476.5465). Your assistance is appreciated.

Summary

Sometimes accidents just happen. Some jobs have inherent risk built into them. Other times, accidents and injuries occur because of the following:

- Poor decision making
- Not taking responsibility for our own health and well-being
- Lack of or improper personal protective equipment

Working in the automotive repair industry means you are exposed to potential risk factors every day. Be careful, be responsible and be safe! Just like seat belts in an automobile or helmets on a motorcycle, personal protective equipment can prevent serious injury on the job.

Click to Take Exam

Mechanical Safety Respirators/Air Quality

Learning Objectives:

- Understand the importance of proper respirator use.
- Recognize why respirator fit tests and medical requirements are necessary before using a respirator.
- Identify negative pressure and positive pressure respirators.

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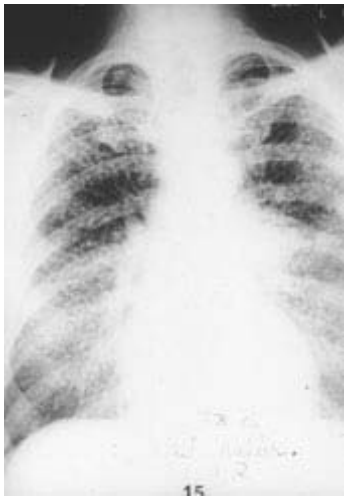
S/P2 Safety and Pollution Prevention

Awareness



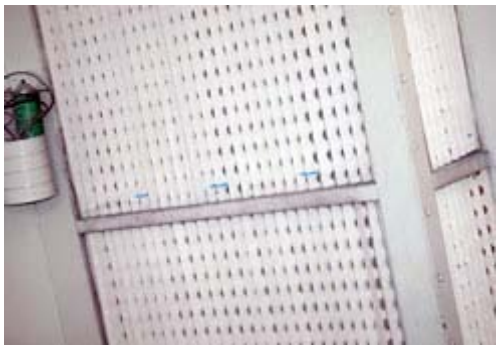
In automotive repair operations there are two important concerns that are directly related to each other. They are:

- An awareness of air pollution and air quality
- The use of respirators when necessary

Getting oxygen to your lungs is critical to your health and well-being. It's a simple biological fact that without oxygen, *you only have a few minutes to live*! Sadly, some people think they are invincible, and they allow their lungs and respiratory system to be damaged unnecessarily over a period of time. By ignoring possible breathing problems and not using the appropriate personal protective equipment, too many people allow irreparable damage to be done.

Employers and the government, particularly the Occupational Safety and Health Administration, are serious about protecting your lungs on the job. In this course, we will address the different types of respirators that are available.

It Comes with the Territory



It's no secret that automotive repair facilities generate airborne dust, solvent, paint and gas fumes that may be inhaled. All of these things can be hazardous. If you work in this type of environment, you need to consult the Material Safety Data Sheet for each of the inhalable products with which you may come in contact to get specific information about the risks inherent in their use.

The automotive repair industry needs to be proactive, so if air pollution can be reduced or eliminated at the source, it should be. For example, when paint is sprayed, a painter creates an airborne pollutant. This doesn't mean we're going to stop painting cars. It simply means that we will use paint booths, filters and personal protective equipment for safety.

Good Employers Want Good Training

Good employers realize where the respiratory risks are in the automotive workplace. In response, they want all of their staff engaged in high-risk jobs to:

- Be trained on how to reduce these risks whenever possible
- Understand when and how to use the right PPE *every* time to protect themselves

As is often the case, taking positive action *before* an injury or illness has a chance to occur is the responsible thing to do.

Respiratory Protection Rules

By law, employers are required to provide you with proper breathing equipment. In addition, each time an employee starts a job at a new business where clear working conditions or job requirements exist that require a respirator, they must receive *written approval* from a physician or other licensed health care professional *before fit testing* for a respirator and *before they use* the respirator.

If you personally have any concerns about the need to use a respirator, or whether you are properly protecting yourself with your current respirator, see your supervisor immediately after completing this course.

keep in mind

If you have not been trained on proper use of a respirator, notify your supervisor or the safety and health representative after completing this course. Let them know you need to be checked and fitted before proceeding further.

Annual Written Respiratory Review

Currently, employers are required by law to provide an *annual written respiratory review* for workers using respirators. The form is filled out by the employee and then submitted to a physician or licensed health care professional, who will then determine whether a physical checkup is necessary.

Points to Cover; Points to Consider

Your employer, in addition to providing respirators for your protection, should be doing the following as well:

- Determining whether there are hazards in your shop, explaining the possible causes of respiratory problems and explaining how you can best protect yourself
- Making sure you use the correct respirator in a proper manner

It is *your* responsibility to do the following for your own protection:

- You must keep your respirator clean and in good working condition
- You should notify your employer if you have a respirator problem or any respiratory questions

Don't Make Someone Ask

Respirators will do a great job of keeping you safe, but they can only help if you use them. By law, employers must either *require* you to use them or provide *verbal warnings* and then *written warnings* if you refuse. You *can be dismissed* from your position if you decide that you either aren't going to wear a respirator or that you aren't going to wear the respirator correctly.

Good businesses want their employees to be safe, and they will monitor the workplace to ensure that safety, but they can't nor should they have to baby-sit their employees at all times. As a conscientious employee, you should help yourself and the company you work for by always wearing your respirator properly and by reminding other workers who may not be protecting themselves correctly to do the same.

Fit Testing

Respirators do a great job of protecting your respiratory health, but only if they fit correctly. Once you have the right respirator for the right environment, you must be *fitted and checked* to make sure that you and the respirator work well together. Since there are dozens of different styles and types of respirators, there is a great deal of science and experience required to make sure you are protected.

If you change jobs, you should expect to be asked to have a respirator fitted before you start working on the new job.

Negative Pressure Respirators

One of the most commonly used respirators is the *negative pressure respirator*. Negative pressure respirators work on a very simple principle: When you inhale you pull air through a filter; when you exhale, a valve allows your used air to escape.

keep in mind

If filters aren't working, check for the filter installation. Also, if the filters are clogged, install new filters. If you find smell contaminant, check the exhale valves and seal to face. It's hard to exhale, check the exhale valves.

Facial Changes

If any changes to the shape of your face occur *after* the original fitting, it is more than likely that your respirator may not work correctly. By growing a beard, moustache, thicker sideburns or simply not shaving regularly and having noticeable stubble, you may be causing subtle changes to the fit of your respirator that could put you at risk. Similarly, if you gain or lose a lot of weight, the negative respirator may not work correctly for you.

keep in mind

The bottom line is this: Anything that interferes with the seal of a respirator or gets in the way of the exhale valve is reason to notify your supervisor. Also, if the respirator you are given isn't acceptable *for any reason*, you again need to notify your supervisor. They will help you find a different respirator that will work. Any change in respirators will mean that you must be retested for fit.

Positive Pressure Respirators

Positive pressure respirators bring fresh air to you through a hose. They also must be fit tested; however, for people with beards or other fit issues, a positive pressure system can work well *without the need for a tight face seal*. Proper use issues are different and perhaps a little more complicated. The most important issue is to make sure that the air supply itself is correct and breathable.

CCAR strongly recommends that you take time to learn more about respirator safety and health in the workplace. You can visit the CCAR GreenLink Web site and view more information from federal and state governments and industry. Your employer wants you safe, but part of being safe is *taking personal responsibility* to learn on your own as well.

Specific Information for Your Area

To our knowledge, federal laws and guidelines are all that currently apply in your state. If you are aware of any other state laws or regulations not included in this training, please notify CCAR immediately (888.476.5465). Your assistance is appreciated.

Summary

Always remember:

- Be aware of the sources of hazardous air pollution in an automotive shop
- Know how to use the variety of devices that can protect you and the environment from that hazardous air
- Remember to use a properly fitted respirator when necessary

By taking the proper precautions, you'll literally be able to "breathe easy" in the workplace!

Click to Take Exam

Mechanical Safety Fires

Learning Objectives:

- Identify flammables in a shop.
- Recognize the four types of fire extinguishers.
- Understand fire extinguisher safety and usage.
- Understand what to do if there is a fire.

Training Content Provided by

S/P2 Safety and Pollution Prevention

Fire Safety is Serious Business

Like most people, you no doubt spend a significant part of your work day simply walking around your shop, doing everything from picking up parts to taking a lunch break. During that time, how many times do you think you walk right by a fire extinguisher without even thinking about it?

Fire extinguishers are typically located in every kind of business, and yet, if someone asked right now where the extinguishers are located in your shop, could you tell them? Do you know how many there are, what kind of extinguishers you have, and what type of fire they're used for?

We all seem to take it for granted that a fire at work is something that just happens to other people. In reality, nothing could be farther from the truth! Working in the automotive repair industry, *you are at a high risk* of being involved in a fire. Will you be prepared if it happens to you?

High Risk Environment

By its very nature, an automotive repair facility represents a greater fire risk than many other types of businesses. The primary reason for this is the high number of items considered flammables that are present in this environment. The list includes:

- Degreasing and cleaning solvents
- Stored paints and solvents
- Sprayed paints
- Glue
- Oxygen/Acetylene
- Gasoline in caddy, or portable container
- Gasoline in the cars
- Oil
- Gasoline in on-site storage tanks
- Diesel fuel

When you combine these flammable materials with the fact that much of the work that goes on in a repair facility involves hot metal, sparks from grinding, or even open flame from torches, it's evident that a significant risk factor does exist.

Firefighting-the Safest Option

Fire jumps and moves from place to place quickly, particularly in an environment where a lot of flammable materials are kept. If a fire gets out of control, the best thing you can do is *get safely out of the building* and advise others to do the same. Being a hero may seem exciting, but the very best outcome in a fire is when everybody in the building gets out safely and without incident.

If a fire should break out in your building, remember:

- Stay calm! Panic can quickly become chaos, and that's when people get hurt.
- If your building is equipped with fire alarms, pull the alarm. If there are no fire alarms, in a loud *but calm* voice, yell "fire," and be sure that everyone has heard you.
- Walk quickly to the nearest exit. *Do not run*. Running leads to panic and to possible injury.
- Once you and everyone else are safely outside, call the fire department.

keep in mind

If a fire should ever start in your facility, remember this: Firefighting is best done by professionals.

What About Fire Extinguishers?

Most firefighting is best left to professionals, but there are some small fires that can be handled with the company's portable fire extinguishers. *However, you need to know exactly where in your shop the fire extinguishers are located.*

If a fire breaks out, you don't have time to *think* about where they *might* be located. You need to instinctively go to where you *know* they are located. The time difference involved between *thinking you know* and *knowing for sure* might represent the very small window of opportunity you have to fight the fire in-house.

It is also critical to understand that *not all fire extinguishers are the same*. They are designed to handle different types of fires, so it's very important to understand which extinguisher to use on what type of fire. The wrong choice not only won't put out the fire, but *could make the fire worse*.

Types of Fire Extinguishers

You should know that fire extinguishers are rated to cover the following four fire ratings:

- Class A fires - Ordinary combustibles or fibrous material, such as wood, paper, cloth, rubber, and some plastics. On this type of fire, use water or dry chemical extinguishers (classified "ABC").
- Class B fires - Flammable or combustible liquids such as gasoline, kerosene, paint, paint thinners, and propane. This type of fire would require a CO_2 or dry chemical extinguisher.
- Class C fires - Energized electrical equipment, such as appliances, switches, panel boxes, and power tools. Again, use CO_2 or dry chemical extinguishers.
- Class D fires - Involving combustible metals such as magnesium, sodium (spills and in depth), potassium, sodium-potassium alloys, uranium, and powdered aluminum. This special type of fire requires a dry powder sodium chloride extinguisher. *Do not use this type of extinguisher on class A, B, or C fires*.

Types of Fire Extinguishers (Continued)

Below are examples of the four types of extinguishers used in the automotive repair facility environment:

keep in mind

Class A - Water Extinguisher Wood and paper	Class B - CO2 Extinguisher Flammable fluids
Class C - CO2 Extinguisher Electrical	Class D - Special Agents Combustible Metals

Additional Fire Extinguisher Facts

Make it a habit to exercise some personal responsibility. Reach over when you walk by a fire extinguisher and check the tag and gauge. Help management know if a fire extinguisher is out of date or has low pressure.

facts and stats

Fire extinguishers should be:

- Close by...no more than 50 feet away
- Easy to get to and in every work area (no doors or walls between)
- Inspected monthly
  - The gauge should read full or be "in the green"
  - The safety pin should be in place
  - The seal should not be broken
- Mounted with easy to read and approved "Fire Extinguisher" signage
- Mounted in proper manner and within reach
  - Quick release
  - Between 36 inches and 60 inches off the floor
  - Never left loose on a bench or on the floor

Using a Fire Extinguisher Properly

The actual operating procedure for a fire extinguisher is very simple.

1. Pull the pin
2. Stand about eight feet from the fire
3. Aim the hose at the base of the fire
4. Squeeze the trigger and sweep back and forth

A fire extinguisher generally only lasts from just a few seconds to a maximum of about 25-30 seconds, so *aim properly*. If the fire is small, this should provide sufficient time to put the fire out.

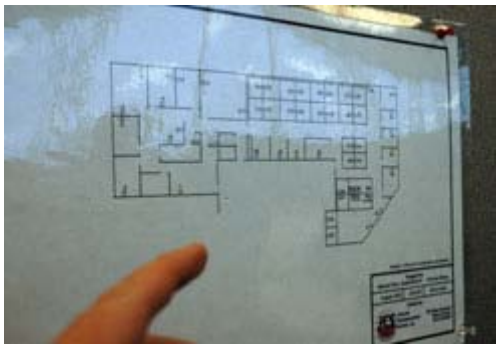
Be Sure the Path is Clear

To ensure a safe and timely evacuation of the building in case of a fire, keep aisles and fire exits unblocked by boxes or machinery. If you see fire exits blocked, either:

- Move the items blocking the way
- Make a supervisor aware of the situation so that they can have the blockage moved

Again, take personal responsibility for creating a safe working environment for yourself and your coworkers. Don't assume that someone else is going to take care of a problem. If you see a problem, *either report it or fix it*.

Know Where You're Meeting



You should have an *agreed upon outdoor assembly area* so that, if a major fire breaks out, you can *quickly identify if anyone is missing* or possibly trapped in the building. The first thing the fire department will ask is if everyone is accounted for. Be prepared to give them precise information. *The number one responsibility when a fire breaks out is the safety and well-being of employees.* Remember, buildings and equipment are replaceable - people aren't!

Have a Fire Safety Plan

All automotive repair facilities should have a fire safety plan in place. It needs to be *reviewed, at a minimum, on an annual basis*. In addition, a *mock fire evacuation* should be done, again at a minimum, annually. The fire safety plan should include information on the following:

- Where fire extinguishers are located
- Which exits are *approved and marked* fire exits
- Where employees should assemble outside the building

Specific Information for Your Area

To our knowledge, federal laws and guidelines are all that currently apply in your state. If you are aware of any other state laws or regulations not included in this training, please notify CCAR immediately (888.476.5465). Your assistance is appreciated.

Summary

It's as simple as this: The key to fire safety is to be prepared.

Being prepared means having a plan and reviewing the plan on a regular basis. Don't assume that you'll know what to do if the time ever comes. Without a plan, important minutes can be lost that could literally mean the difference between life and death for you and your coworkers. Be smart, be safe, and be prepared!

Click to Take Exam

Mechanical Safety Electrical

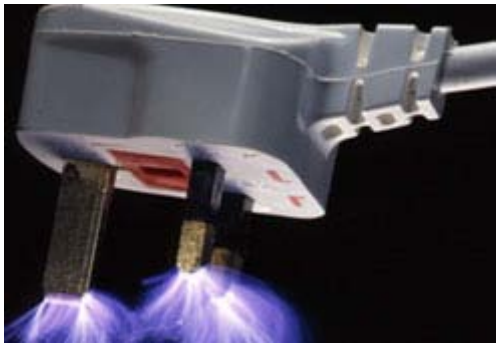
Learning Objectives:

- Understand the danger of electricity.
- Identify the most common potential electrical hazards.
- Describe electrical safety issues in warehouse-type operations.
- Learn ways to protect yourself when working around live wires and parts.

Training Content Provided by

S/P2 Safety and Pollution Prevention

Electrical Safety



This module is designed for non-electricians. It will give the simplest of overviews on how electricity works.

Electricity provides us with a great many benefits. It provides energy for our lights and powers things both on the job and at home. It is such a normal part of our lives that we often take it for granted, and we forget that electricity can be very dangerous, especially on the job!

As professionals in the automotive industry, we work with a variety of electrically powered equipment and tools on a daily basis. As we risk possible exposure to a variety of different injuries. And yet, electrical devices have become so well built and doubly insulated that many of us have never experienced even a minor electrical shock. Whether it's due to insufficient knowledge regarding electrical hazards or because we take electrical safety for granted, we often seem to be unaware of the mighty power around us every moment.

Avoid Shocks and Electrocution

Respecting the power of electricity is critical to our health and well-being because an unexpected electrical shock can be severe enough to *burn* or *even kill*. Electricity is associated with 10 percent of job-related deaths, as well as many serious injuries.

facts and stats

Ten percent of all job related deaths are by electrocution!!!

How Electricity Works

Electricity travels through wires to our homes and workplaces and is usually generated from a source such as a dam, a nuclear power plant or a coal-burning power plant. In some areas of the country, windmills may also generate electricity.

At least two wires are required to carry electricity, although there may be more. One is the negative side (-), and one is the positive side (+). Once electricity is generated, it flows along a wire or path, and is controllable and will do the work you want, unless something touches it that allows it to flow through it/them into the earth to ground itself.

Conductors and Non-Conductors

Wires are the highways that electricity travels along. They are typically comprised of common metals such as copper or aluminum. Most metals "conduct" electricity.

If you touch a bare wire while electricity is flowing through it, the electricity may run through you, as you become part of the circuit. Or, it may run through you to the ground itself. When electricity runs through you, you will receive a shock. Be assured, it is an experience that you would never want to go through again!

Shocks are disturbing, scary, and painful. The power of electricity is so great that a person who is shocked with common household electricity will typically be unable to control his thoughts or body movements when this happens. That's why wires are not left as exposed metal, but are covered in materials such as rubber or plastic. These *insulators* resist electricity and keep the current in its intended path.

keep in mind

Materials that allow electricity to flow are called *conductors*. Materials that DO NOT permit electricity to flow are called *insulators*.

Conductors and Non-Conductors (Continued)

Conductors - Good conductors of electricity include:

- Copper
- Aluminum
- Steel
- Lead
- Water

Insulators - Poor conductors of electricity include:

- Rubber
- Plastic
- Glass
- Wood

Electricity Wants to Return to the Earth

By its nature, electricity is always trying to return to the earth. The best example of that would be lightning strikes. Lightning is the result of both upward and downward moving forces. What we see during a storm is a bolt that travels from the ground into the cloud.

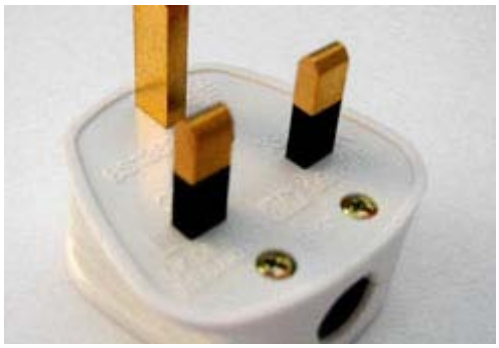
Water Helps Electricity Travel

Water is a conductor of electricity. Unless contained, (through wires, for example) electricity always finds the first available or easiest way to either complete its circuit or leave its circuit and travel to the earth. Trees, towers and tall buildings are easy targets for lightning to go through to the earth.

If you are outside in an electrical storm, you could present a convenient target for a lightning strike, which by traveling through you, could find the shortest distance to earth...an event that could prove to be fatal for you!

Being wet or standing in water is very dangerous when handling electrical devices! Should there be a crack in an extension cord or broken insulation in a tool you are using, the electricity can flow easily through you and into the water, which is part of the ground.

Plugs and Extension Cords



Everyone uses common extension cords at home or where they work. Inside the flexing cord is a metal wire, and outside the wire is a protective insulating material that keeps electricity running inside and through the metal, as opposed to outside and through you.

There are electrical devices which have two-pronged plugs and three-pronged plugs. Most of the time, two-pronged plugs are for home use. In heavy use or larger electrical equipment, wires always have a third wire called a ground wire. By connecting the wires to the third ground wire, which is located in the metal circuit box, your body is being protected from becoming a conductor through which electricity can travel. Any leakages will find their way, in most instances, to the ground wire first and not to you.

OSHA Rules for Controlling Electricity

The Occupational Safety and Health Administration has some very detailed regulations designed to keep electricity from becoming a hazard in the workplace.

- Control panels or switch boxes that could produce dangers or sparks must be enclosed
- Electrical equipment of 50 volts or more must be kept in separate rooms or enclosures, behind partitions, or stored at least eight feet above the ground
- There must be a 30-inch minimum clearance in front of electrical equipment that has less than 600 volts. Electrical equipment over 600 volts must be locked or guarded behind an eight foot fence

Keep Switches and Breakers Clear

Most businesses make it a point not to store anything in front of major switches and breakers. Because they are energized, many companies paint lines in front of the switches and breakers to prevent anything from *accidentally* being parked or placed in the way, in case they must be turned off in an emergency.

keep in mind

Nothing should be in front of or block switches or breakers.

Fast Life Saving Switches-GFCI's

Since the 1980s, switches have been developed to save lives from electrical short circuits. You may have one in your home, and new homes are required by law to have them in the circuits in bathrooms and kitchens. That's where you are most likely to be working with electrical items such as hair rollers, shavers, mixers or electric knives. These switches detect a surge in electricity and quickly turn the electricity off.

A ground fault circuit interrupter cuts off power if there is any electrical leakage that could cause shocks in wet areas such as outdoors or in bathrooms. To protect against improper usage, electrical wires, cords and equipment often have labels identifying their voltage and current capacity. Cords designed for special uses are also labeled.

Industry is becoming very familiar with GFCI's as well. If a tool has a short circuit that can't be seen easily, a GFCI will shut off electrical equipment including fuses or circuit breakers when they become overloaded.

General Hazards

The main purpose for insulation and GFCI switches is to prevent shocks. You are particularly at risk when a wire isn't properly enclosed or has defective insulation. A shock can also occur when you make direct contact with live electricity, like a power line or electrical socket.

Electricity and the Human Body

The longer your body is in contact with an electrical current, the greater the risk of death. Electricity can cause:

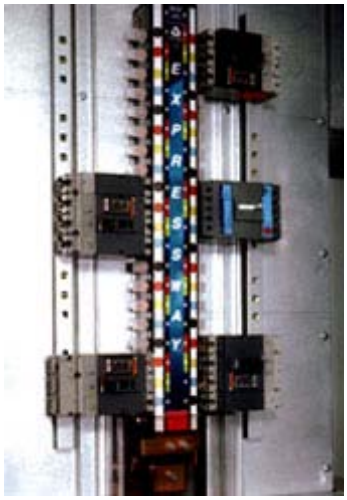
- Pain
- Loss of muscle control and coordination
- Internal bleeding
- Damage to nerves, muscles or tissues
- Cardiac arrest
- Death (with very high voltages)

Electrocution is the most severe kind of shock, and it doesn't take much electrical power to kill you. Household electricity is usually 110 volts, but in your workplace there can be voltages of 440 and higher. Either one, with prolonged exposure, is capable of causing fatal electrocution.

Overloaded Circuits

Overloaded electrical circuits or equipment can cause overheating and can make the wires and circuits very hot. Overload can even lead to *fire* or an *explosion*. This is especially dangerous in areas that have flammable or explosive substances nearby.

Turn off Electricity



Suppose someone receives a shock, or a piece of equipment is throwing sparks or arcing. Should you approach them to help them? The answer is no!

keep in mind

Never touch a person who is being electrically shocked! The best thing to do if electricity is loose in any way is to turn off the power source as fast as you can, so know where the switch or breakers are!

Something all employees should know, and what your company should help you understand, is how to turn off the electricity in case of an emergency. I f you do not know how to turn the electricity off, *ASK* **your direct supervisor or the right person in your organization.** *A few seconds can literally mean the difference between life and death.*

Mark Electrical Switches and Breakers Clearly

Breaker boxes, switches, motor cutoffs and appliances must be marked and easy to understand and read. The sign should indicate its purpose, unless the switch or breaker is so closely located and arranged that the purpose is evident.

Electrical wires are like the branches of a tree, and sometimes the cut-off device is away from where the end use is taking place in your shop. Therefore, *each service, feeder, branch circuit and its method of disconnect must be clearly marked to indicate its purpose.* These markings should be clear and durable since sometimes oils, heat, or just plain wear can cause them to become unreadable. Signs should be clear and durable to withstand their environment.

Electricians sometimes call switches "disconnects" or a "disconnecting means." A disconnecting means is also a switch that is used to disconnect the circuit from the very source of electricity. Disconnect switches, or means, are important because they stop the flow of electricity and protect workers and equipment.

OSHA Regulations and Frequent Violations

One OSHA electrical regulation is specifically aimed at reducing electrical accidents and injuries. The detailed Electrical Safety-Related Work Practices Standards are aimed at "qualified" employees who have "training in avoiding the electrical hazards of working on or near exposed energized parts." *Qualified employees must be able to recognize exposed live electric parts and their voltage, as well as the clearance distances.*

This standard defines all other employees as "unqualified." This means they have no special training in recognizing and avoiding electrical hazards, but might be exposed to electrical shock on the job.

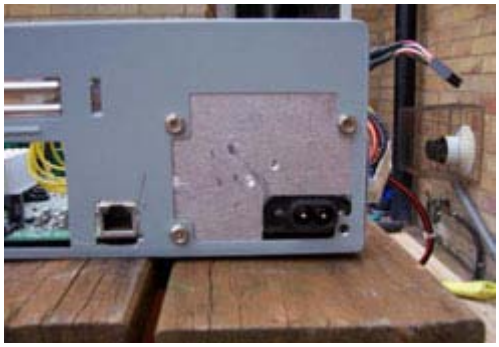
All employees, both qualified and unqualified, need some knowledge of electrical safety and the protections included in the new standard.

Energized Parts or Areas Can Hurt You

Energized areas are best thought of as the place where electricity enters buildings or is turned on or off. Exposed energized parts may have warning signs and tags on them. Large ones may have barricades to prevent out of control vehicles such as forklifts from accidentally ramming into them. In large plants and factories, there may even be an attendant to keep people out of harm's way.

Energized parts must be labeled in such a way that it *communicates and protects* workers from contact.

Identifying Hazards



To use electricity safely, you have to be able to identify the most common causes of electrical accidents and injuries:

- Loose electrical connections
- Cords and wiring with missing or frayed insulation
- Equipment running beyond capacity
- Tools that cause shocks or emit smoke, excessive heat, odors or sparks
- Wires running across the floor
- Electrical cords left near heat, flame or water
- Electrical cords or equipment that creates an arc, being used around hazardous, flammable or explosive materials (unless specifically designed for such uses)

Leave it to the Pros

Electrical repair should be left to skilled, trained people. If you spot one of the aforementioned hazards, don't touch anything. Report it immediately, so electricians can make the proper repairs. Everyone in the company is responsible for safety!

Leave it to the Pros (Continued)

Unless you are professionally trained to work on electrical equipment, you are much better off not attempting it. Professional electricians have special non-conducting personal protective equipment such as rubber gloves, boots and special tools.

In addition, a professional will have greater awareness of safe practices. For example, a professional would never put a ladder near electrical lines.

Flexible Cords and Cables - High Risk

Even though we have mentioned it before, it bears repeating; electrical cords and cables that are required to flex or move a lot receive more wear than fixed electrical lines in the walls or in conduit, and that puts the insulation at risk.

Be observant and point out cord wear to your manager or supervisor, even with things as simple as extension cords. Other larger flexible electrical wires, cables and cords that move about may be on:

- Moveable lights or lamp holders
- Portable lamps or appliances
- Elevator cables
- Lifts, cranes, and hoists
- Charging apparatus, such as forklift batteries and vehicle batteries

Flexible cords are at high risk of damage by activities in the area, movement across the floor, sharp edges, staples or fastenings, abrasion from rubbing against things, or *simply by aging*.

If the outside covering wears and the conductor becomes exposed even a bit over a period of time there will be danger of shocks, burns or fire.

Splices and Terminations

Flexible cords are to be used *only* in continuous lengths, which also means no splicing or taping. Remember, electricity wants to find its way off the cord and into the ground by the easiest means possible, even if that means YOU. A spliced cord presents just that kind of opportunity. Electricity is also most likely to leap where there is water.

Flexible cords should be connected to devices and fittings so that strain relief is provided, which will prevent pull from being directly transmitted to joints or terminal screws. Strain occurs at the ends of the cord, either at the plug or the receptacle.

keep in mind

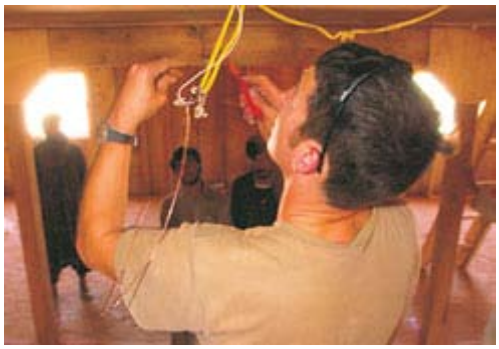
Worn, frayed or cracked flexible cords should be discarded and replaced! Never carry a tool by its cord! Always pull a cord from a receptacle by its plug...not the cord itself!

Common Sense Electrical Safety Procedures

There are a number of common sense safety procedures that can help prevent electrical accidents:

- Make sure you know where electrical shut offs are
- Inspect electrical equipment and wires before use to make sure they're properly insulated and grounded
- Don't de-energize or turn off circuit breakers unless you've been trained as a qualified electrician
- Avoid using extension cords whenever possible
- Inspect portable equipment before each use
- Be sure electric plugs match their receptacles; never alter a plug
- Make sure your hands are dry before you handle anything electric
- Don't use any piece of electrical equipment that emits sparks, smoke or odors
- Be especially cautious around flammable liquids, vapors, or dust or any area that might have held them; arcs can set them off
- Never use a metal ladder around live electricity
- Always obey barriers, signs, and other warnings near electrical equipment

Good Housekeeping



Good housekeeping includes procedures that help prevent electrical fires. This means keeping your equipment and work area clean and organized. Remember:

- Keep machines and tools properly lubricated
- Don't let grease, dust, or dirt build up on machinery
- Don't leave machinery or heating equipment running unattended
- Leave at least three feet of workspace around electrical equipment
- Keep the work area clean
- Don't leave cords tangled or lying across an area where people walk

First Aid

The safety procedures outlined in this course, along with your caution and common sense, should serve to prevent serious electrical problems. However, it is still a good idea to know what to do in case of an accident. The following first aid procedures should be followed if accidents occur:

- Don't touch a shock victim
- Turn off the power to the electric current
- Use a stick or other non-conducting object to push the victim away from the source of the shock
- Call for professional medical help

Rinse electrical burns with cold water and cover with a clean, dry cloth. If it's a major burn, cover it with a clean, dry cloth and get immediate medical attention.

Notify firefighters immediately if there is a fire, and be sure to let them know if it is an electrical fire. Don't touch a burning object related to electrical fires or throw water on it. Electricity can travel directly up the water and into you. In electrical fire situations it is always best to wait for the professionals.

Specific Information for Your Area

To our knowledge, federal laws and guidelines are all that currently apply in your state. If you are aware of any other state laws or regulations not included in this training, please notify CCAR immediately (888.476.5465). Your assistance is appreciated.

Conclusion

Do not take electricity for granted. We have lights, tools, machines, TVs, stereos and many other useful products consuming electricity every day. When you think about all the power needed to run that equipment, it only makes sense to use caution. Electricity *can kill if it is not handled properly*.

Only qualified workers should work on energized systems. Obey all tags and signs around electrical equipment. Don't handle anything electric with wet hands. Frequently inspect electrical equipment for any problems or disrepair. Keep your equipment clean and in good order. If the equipment does not look, sound, smell or work quite right, turn it off and report it. It's better to be safe than sorry.

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Mechanical Safety Slips and Falls

Learning Objectives:

- Recognize the underlying causes for slips and falls in the workplace.
- Identify the steps that can be taken to minimize the opportunity for accidents to occur.
- Understand that safety on the job is everyone's responsibility.

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S/P2 Safety and Pollution Prevention

No Laughing Matter

There's probably no one alive today who could tell us the first time someone laughed at the classic "slipping on a banana peel" gag. Whether it's the old days of vaudeville or the movies and TV of today, the sight of somebody falling down is usually a guaranteed laugh.

facts and stats

According to a survey done by the Bureau of Labor Statistics several years ago, there are almost *3,000 nonfatal and almost 700 fatal work-related falls occurring annually*.

However, falling in the workplace is no laughing matter. Occupational falls are associated with high rates of lost time from work and medical costs. Therefore, it is in everyone's best interests to understand the risks involved and learn ways to avoid this type of hazard.

Why Is It Happening?

In the automotive repair industry, there are primarily four common causes for people falling and hurting themselves:

- Slick floors
- Cluttered floors
- Stairs
- Ladders

When you examine the causes and begin to understand why these accidents are happening, you quickly begin to realize that the majority of them are easily avoidable. In the pages to follow, we'll discuss how that can be accomplished.

Slick Floors

Shop floors get slick. It's a fact that comes with the territory you work in. It's very easy for a little bit of oil, water or antifreeze residue to miss a drip pan. Rain from outside may come in on vehicles for repair and the floor can quickly become very slick. If someone mops the floor with water, until it dries it can be as slick as oil.

Maybe as you read this, you're thinking of the "banana peel" gag mentioned earlier in the course. If so, let's replace that visual with another one: One second you are smiling and walking through the shop, maybe thinking about what you are going to have for lunch, when all of a sudden, your feet go out from under you and you go down. Your legs separate into the splits, pulling muscles or tendons, or perhaps you bang your elbows or head into something very hard.

It's not funny anymore, is it?

Here's the Good News

As grim as the scenario just described might be, the good news is that it is *easily avoidable*. As we just said, slick floors happen as part of our business. However, just because a floor gets a bit oily or wet, *doesn't mean it has to stay that way*.

Here are some things that can be done to keep people from slipping on floors:

- Anytime oil or fluids are spilled on the floor, *immediately clean them up*, using the right drying method
- Mark a slippery area with an *easy-to-use tent sign* that says "Caution, Slippery Floor"
- Have the *proper absorbents* in an easy-to-find place to quickly put on spills
- Wear slip-resistant footwear

All that's required here is some *common sense* and some *personal responsibility*. If you're responsible for the floor being oily or wet, *clean it up or wipe it up*! Don't wait for someone else to do it. Procrastination means you or someone else could get hurt.

Footwear

In workplaces where floors may be slick or where workers may encounter foot hazards (both of which are a very real possibility in the automotive repair environment), the *use of proper footwear can help prevent slips and falls*. Since there is no one type of shoe or boot that protects people from all types of hazards, you should *consult with a footwear supplier* on what type of footwear is most appropriate for your working conditions.

Cluttered Floors

Clutter that ends up in the aisles or in the middle of the floor is an accident waiting to happen. Leaving a floor jack or a bucket in the aisle, even for just a second, is an easy way to trip up a co-worker or yourself. Keeping high traffic areas of your shop clear of tools or debris is everyone's responsibility.

Once again, *common sense and personal responsibility* need to prevail. Some people don't mind working in clutter, others feel there's "a place for everything and everything in its place." Regardless of which side of the fence you may be on, please be considerate of your co-workers and make certain that you are not responsible for leaving anything in the path of others that could cause an accident.

Stairs

Stairs, simply by the manner in which they work, are areas where people are inclined to hurt themselves. Even though OSHA has requirements for how stairways must be constructed so that they are safe, on an individual basis, you need to exercise *good judgment and restraint* when going up or down stairs. Don't run up and down stairs, and don't carry so many items in your hands that you obscure your view of the stairs.

If the stairs you use have more than just a few steps, the stairway needs to have a handrail, and you should use it. Architects are required by law to design good handrail protection into new facilities, but older facilities may not always have good handrails. OSHA has specific requirements for where handrails are placed. If there are no handrails, point out to management anything you feel is unsafe, and be extra careful when you use those stairways.

Ladders

Even though the work area for repairing cars might not *seem* to be a place where ladders would be used, consider the following workplace tasks:

- Windows need to be washed
- Lights need to be cleaned or bulbs need to be changed
- Paint booth filters need to be changed
- Trucks need service
- The tops of vans need to be sanded for refinish
- Parts need to be accessed that may be stored on high shelves

If you've ever watched someone use a ladder, it's very likely that, at some point, you've seen them use the ladder incorrectly. The likelihood that you will get hurt if you're using a ladder *incorrectly* is significant, so consider the safety tips on the next page.

Ladders (Continued)

First and foremost, *never get on a ladder without checking the weight restrictions* (note: you need to factor the total of your weight plus the weight of the item(s) you're carrying on the ladder with you). Ladders are classified by weight restrictions.

facts and stats

Ladder Type	*Weigh Limitation*
Type I-A	300 pounds
Type I	250 pounds
Type II	225 pounds
Type III	200 pounds

Never, *under any circumstances*, stand on the top step of a ladder. If you make a habit of standing on the top step of a ladder, it won't be a case of *if* you have an accident; it will be a case of *when* you have an accident!

Make sure that the ladder's legs are rock solid. Once again, tempting fate by standing on a wobbly ladder is going to ultimately result in an accident. Also, avoid placing the ladder too far from or too close to the wall itself, again, due to issues of stability. Straight ladders should be placed at a four-to-one ratio. This means the *base of the ladder should be one foot away from the wall or other vertical surface for every four feet of height to the point of support*.

Openings & Platforms

An opening in which there is a drop of *more than four feet requires a guardrail or a cover* to be installed. Openings, such as stairwells or holes in floors that are in high traffic areas, are accidents waiting to happen. Some work locations have different levels, platforms or steep inclines where handrails and protection from falls are needed, such as older garages with alignment pits and garages built on steep inclines.

Platforms, or any type of elevated surface, need to be clearly marked and the weight capacity for that particular surface should be indicated.

Railings & Toeboards

A proper railing can prevent falls from an elevation. Guard rails should protect all sides of an opening or platform (except the entrance, which can be protected by a gate). Stair railings should have at least *three inches of clearance from the surface they are mounted on and should be located between 30 inches and 34 inches above the leading edge of stair treads*.

Railings will help prevent employees from accidentally falling through an opening, but won't prevent objects from falling on employees who might be passing below. In such cases, you might also need a toeboard, which is a raised protective edge (usually four inches high) that can be placed at the edges of landings, balconies, mezzanines, etc. *In elevated situations where there is a danger of kicking something onto someone below, the use of a two by four toeboard is required by OSHA.*

Poor Lighting Puts Employees at Risk

It's just common sense. *A slip, trip or fall is more likely to occur when workers can't see where they are going.* You can take all the other precautions and follow all the other suggestions outlined in this course, but the bottom line is this: if you can't see where you're going, sooner or later an accident is going to happen.

Lighting should be carefully placed and maintained so that workers can see what's in their path and avoid hazards. If you see a light that needs to be replaced or repaired, either make a manager or supervisor aware of the situation. Or, if it's within your power to do so, go ahead and change it yourself.

Your Brother's Keeper

If you see a floor that's wet, mop it up. If you see oil on a floor, put down some absorbent. If an aisle is cluttered, move the clutter. In lieu of exercising one of these options, at least make a manager or supervisor aware of the situation. You might ask "Why should I do it? I didn't make the mess."

keep in mind

Safety on the job is everyone's responsibility. How would you feel if you saw that there was a wet spot on the floor and you didn't do anything about it, and 30 minutes later somebody in your shop took a fall that put them in the hospital? Maybe the wet spot wasn't your fault, but you share responsibility in the fall, because *you saw that a risky situation existed, and didn't do anything about it*.

Be safe, and help others around you to be safe. We all need to look out for each other.

Specific Information for Your Area

To our knowledge, federal laws and guidelines are all that currently apply in your state. If you are aware of any other state laws or regulations not included in this training, please notify CCAR immediately (888.476.5465). Your assistance is appreciated.

Summary

The high cost of slip and fall accidents make them serious concerns for every automotive repair facility. According to an article entitled Costs of Occupational Injuries & Illnesses quoted by the TV show *Frontline*, "The total direct and indirect costs associated with these injuries and illnesses were estimated to be $155.5 billion, or nearly three percent of gross domestic product (GDP)" (Leigh, Markowitz, Fahs, & Landrigan, 2000).

Using caution and following safety guidelines will help lower the cost of slips and falls in the workplace, and more importantly, keep people safe.

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Mechanical Safety Power Tools

Learning Objectives:

- Recognize dangerous situations involving power tools.
- Understand how to prevent injuries involving power tools.

Training Content Provided by

S/P2 Safety and Pollution Prevention

Introduction

Automotive technicians understand the need for quality drills, air ratchets, grinders and air nozzles. These are the tools of their trade, and to do their job well, they need equipment that's up to the task. They realize that work is easier when you pick the right tool for the right job.

It is also very important that all technicians have a healthy respect for the power tools they work with. The word "power" implies that there is something besides the muscle the technicians themselves provide that make the tools work. It may be the power of electricity, or it may be the power of compressed air. Regardless of the type, it is critical to the health and well-being of the technician to understand that improper use or handling of this power can result in *serious injury* or even *death*.

Follow Manufacturer Recommendations

One way of ensuring proper tool usage is to read the manufacturer's instructions for the use and maintenance of their products. All manufacturers provide clear recommendations for the safe handling of their equipment. Unfortunately, some technicians sometimes use tools for purposes other than that for which they were designed, or use them in an otherwise unsafe manner. Anytime someone chooses to use a tool inappropriately, they are putting themselves, and possibly others around them, at risk. Be smart, and be safe!

Use Personal Protective Equipment

Personal protective equipment is as important to a technician as any tool they might use. In the process of grinding, sanding, chiseling or drilling there is always the possibility that debris is going to fly up into your eye, or you can be working in a tight spot and have a tool slip, putting your hands at risk for injury. PPE that should be used by every technician includes:

- Goggles or safety glasses
- Gloves
- Ear plugs
- Respirators
- Work shoes or boots

keep in mind

You can be using a power tool properly from a technique perspective, and *still get hurt*, if you choose to operate it without donning protective gear. For detailed information on PPE, consult the S/P2 courses on *Avoiding Injury in the Workplace* as well as *Respirators*.

Always Examine the Cord

The cord on a power tool is the path that electricity follows from the power source to the tool itself. Knowing that, it's easy to see that *a defective power cord is an accident waiting to happen.* In addition to the obvious personal risk of anything from a mild *shock* to *electrocution,* there is also the risk of fire that exists if sparks from a defective power tool should *ignite flammable materials* in the shop.

Never use a tool with a cord that is worn or frayed. The same advice applies to extension cords as well. If the damage is obvious, so is the risk. Don't take a chance. Replace the tool or the cord in question.

Sometimes a cord may be defective and not be obvious to the naked eye. A short circuit locator can be run along the cords that are used in your shop which will locate shorts or open circuits. This should be done periodically with all tool cords and extension cords in use. This simple procedure can reduce risk by finding potential hazards *before* they can do any damage.

Don't Damage Cords and Plugs

In many cases, cords become damaged because of inappropriate handling techniques. People get in a hurry and take shortcuts that in the long run will put them at risk by damaging their tools in an attempt to cut a few corners. To prevent this from happening to your tools, remember the following:

- Never carry a tool by its cord
- Never yank a cord to disconnect it from the receptacle
- Store tools and extension cords properly

Don't Forget to Disconnect

Obviously, you need to plug in a power tool to be able to use it. *When it's not in use, unplug it and put it away.* You reduce the risk of an inadvertent injury and you protect the tool from potential damage in the process. Other times you will need to unplug include:

- Before servicing or cleaning a tool
- When changing accessories such as blades, bits and cutters

Electricity and Water Don't Mix

Many people use the expression *oil and water don't mix.* While that's very true, a better comparison might be *electricity and water don't mix.* Certainly the combination is much more volatile! *Under no circumstance should you use power tools in or around standing water. Electrocution* is a very real possibility in that situation.

The Power of Compressed Air

When the average person thinks of power tools, they think about electricity. Professional automotive technicians know that there is another important power source used daily in their shops -- compressed air. The same force that can loosen or tighten a lug nut in a *matter of seconds* obviously has the potential to cause injury if not used in a safe and appropriate manner.

keep in mind

Never blow an air nozzle close to your ears
Never blow an air nozzle without protective eye wear, due to the risk of blow-back
Never blow an air nozzle without respirator protection (asbestos on clutch parts)
Never yank an air hose to disconnect it
Always check the regulated air pressure of the air line

Additional Guidelines for Safe Use of Power Tools

Here are some other tips for working safely with power tools:

- Secure your work with clamps or a vise, freeing both hands to operate the tool
- Avoid accidental starting; do not hold fingers on the switch button while carrying a plugged-in tool
- Follow instructions in the user's manual for lubricating and changing accessories
- Remove all damaged portable electric tools from work area and tag them: *Do Not Use*
- Make sure machine guards are in place
- Don't wear loose clothes, ties, jewelry, or gloves that could get caught in the machinery
- Keep the work area clean -- be careful of flammable materials that could catch fire if ignited by a spark from the tools

Specific Information for Your Area

To our knowledge, federal laws and guidelines are all that currently apply in your state. If you are aware of any other state laws or regulations not included in this training, please notify CCAR immediately (888.476.5465). Your assistance is appreciated.

Summary

A recent super hero movie has a line of dialogue that says "with great power comes great responsibility." The same can be said for power tools! By definition, a tool is designed to help make your work easier. If used properly and safely, that will typically be the case. Be a professional, and use power tools in a safe and responsible manner.

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Mechanical Safety Lifts

Learning Objectives:

- Understand the dangers associated with lifting or jacking a car.
- Understand hydraulic jack safety.
- Recognize how to be safe with other types of jacks.

Training Content Provided by

S/P2 Safety and Pollution Prevention

Introduction

Every day automotive repair professionals, who work on every brand and model of vehicle imaginable, have to raise these vehicles off the ground to perform some type of repair or service on them; for example, sometimes motors need to be lifted out or the vehicle raised and the motor dropped. In some respects, these technicians are working much like a tightrope walker without a net; it only takes one slip, just one mistake for them to be in big trouble!

How to Lift a Vehicle

There are several ways a vehicle can be raised off of the ground, but the two most common methods are:

- Full car lifts
- Floor jacks

When you think about the tremendous weight of a motor vehicle, it makes sense to use *every safety precaution available* when lifting it off the ground to work on it. The best lift is the kind that lifts the full *weight of the car* and one that has a *second form of slip prevention* as a double safeguard.

The Risks and Consequences of Poor Training

Over the last century, hundreds of people have died or been severely injured from improperly lifting or securing vehicles during the repair process. What's even more unfortunate is that it's likely many of these deaths and injuries could have been avoided *if the individuals would have had proper training* on the equipment they were using.

Not only are there all kinds of ways to hurt yourself using lifts, there are all kinds of ways to damage the vehicle as well. Clearly, training is critical to both employee safety *and* job security. No service manager, shop manager or owner wants employees to get hurt; nor do they want a vehicle to be damaged because of poor training issues. Neglecting proper lift and jack safety is a sure way to either be seriously injured or dismissed from a job. Neither is a very inviting prospect!

Know Your Equipment

The basic safety recommendations and *weight ratings* can be found in writing on most equipment. If the labeling is not legible or has become dirty over time, most manufacturers are happy to provide new labels at no cost. Ask the shop safety coordinator to do this if you have concerns. Most lift providers have safety information on specific tools and equipment on their Web site as well.

Floor Jacks

Professionals seldom use the jack that comes in the vehicle even though it could be called a floor jack. Professionals use equipment that is faster, more dependable and will work on all kinds of cars and trucks. Most jacks and lifts are hydraulic, although some may be electric, air and hydraulic or electric and air. Always be careful, if using an electric jack, to keep the cord out of water and be sure it is not frayed.

Hydraulic Jack Safety

Here are some guidelines for using hydraulic jacks safely:

- They should never be used beyond weight limits
- Check frequently (following manufacturer's directions) to make sure there is adequate hydraulic fluid
- Never use a hydraulic jack if it has an obvious leak
- Hydraulic jacks should never be used if they allow loads to slip down
- Hydraulic jacks should always be used with jack stands

Don't Make the Number One Mistake

The number one mistake made by entry-level technicians or amateur do-it-yourselfers is *getting underneath a raised vehicle held up by a floor jack without first putting a jack stand(s) underneath*. Experienced, professional technicians are shocked when a new technician forgets to use a jack stand or safe secondary support! Always remember this:

keep in mind

Never, under any circumstances, get under a car without a jack stand or safe secondary support!

Be careful not to use non-approved or makeshift jack stands such as unrated concrete or cinder blocks, pipes or home-welded alternatives. Some water pipes do not have the same strengths as the special steels that rated jack stands and supports do. Also, when conducting work under an automobile, always wear your safety glasses to prevent eye injury.

Ask if You Don't Know Where to Place the Jack!

Regardless of what type of jack you use for lifting the car in your shop, please be sure you know *where to place it on the vehicle* for your safety and the protection of the vehicle. New technicians, apprentices and entry-level workers don't realize how vulnerable a car is to damage from a misplaced jack. If you're not sure where the jack should go, please ask someone for help.

Areas on a vehicle where you should not place a jack are:

- Steering arm
- Floor pan
- Crankshaft pulley
- Driveshaft

Each car has *specific and safe jacking points*, so do not place a lift if you are not sure. You can check the owner's manual for designated support points for jacking your vehicle, ask an experienced technician or ask you manager or supervisor.

Be Sure to Take the Extra Precautions

For added safety, *engage the parking brake* before jacking the vehicle, and *use wheel chocks* at the end of the vehicle opposite the jack to guard against rolling.

There are other types of lifting and jacking devices used in automotive repair facilities, such as engine lifts and transmission jacks. The same rules apply to these. *Read the manuals* and have an experienced technician show you how to use them.

Lift on Level Ground

Always lift cars on *level ground*, never on tilted floors or floors with different heights. If at any time something feels funny or the balance doesn't look right, stop what you are doing and rethink the use of the tool and/or get a second opinion. Always trust your instincts when it comes to matters of safety. If you think something is wrong, you're probably right!

Specific Information for Your Area

To our knowledge, federal laws and guidelines are all that currently apply in your state. If you are aware of any other state laws or regulations not included in this training, please notify CCAR immediately (888.476.5465). Your assistance is appreciated.

Summary

The rules of safety for using equipment to lift vehicles are clear-cut:

- Don't be afraid to ask for help if you don't know where to place a jack on a vehicle
- ***NEVER*** get under a raised vehicle without a jack stand or safe secondary support
- If you ever have any trouble lifting a car or have any questions about techniques or safety, please ask your manager/supervisor for help

Following these rules will help keep both you *and* the vehicles you work on from harm.

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Mechanical Safety Welding

Learning Objectives:

- Understand the ways in which welding can be dangerous and cause injuries.
- Identify ways to protect yourself from injuries when welding.

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S/P2 Safety and Pollution Prevention

Raw Power

All one needs to do is watch a welder in action to appreciate the amount of energy and power being generated. Just the appearance of the personal protective equipment the professional welder wears is intimidating! This raw power can be very dangerous if used by one who is unprepared or untrained.

In the pages that follow, we will discuss the types of welding equipment most commonly used in the automotive repair environment, the risks that are inherent in the welding process and the steps that can be taken to ensure the safety of the welder and the people around him or her.

There are two types of welders commonly used around mechanical and body shops:

- Oxygen/Acetylene Welder
- Gas Metal Arc Welder

keep in mind

Regardless of the type of equipment used, there is one important point that cannot be stressed enough: Never use any type of welding equipment without receiving the appropriate training.

Oxygen/Acetylene Welder

The oxygen/acetylene welder has two tanks of highly compressed gases that, when combined with a spark, create an amazing amount of heat in a controlled flame. One of the tanks used in this process contains O2, or pure oxygen.

Pure oxygen helps things *burn rapidly*, meaning it's *under tremendous pressure* in the tank. If the tank fell over and the top cracked or broke off, the surge of oxygen outward would *propel the tank just like a rocket*. Evidence of the kind of power this generates can be seen in the Hollywood movie, *Jaws*, in a scene in which a diver's compressed air tanks were used to literally blow up the villainous great white shark!

Acetylene

Although the oxygen tank is a significant concern, the more dangerous part in this dual-tank combination is the *highly flammable* acetylene gas. This is the fuel for the high energy welding or cutting torch, and it, like the oxygen, is also compressed. Acetylene is a gas which *burns rapidly* on its own, and is considered *highly explosive*! If gauges are not properly set up, if users aren't trained properly, if gas isn't turned off and if tanks are not stored properly - the level of danger is extremely high!

Tank Storage and Transport

Tanks not in use must be affixed in such a manner that they *cannot fall over*. This can mean special storage holders, or at a minimum *fastening* the tanks to a secure structure such as a wall. Also, be sure you know exactly what's in a tank before you handle it. Read the label and follow these general safety guidelines:

- Store cylinders in dry, ventilated areas on a fireproof floor, away from flammables or heat sources
- Transport cylinders by strapping them to carts so they don't fall or bang into each other; *never drop or roll a cylinder*
- Use cylinders only in areas with good ventilation, with nothing around that could burn or explode
- Keep valves closed when cylinders are empty or not in use, and open them slowly when you have to
- Keep valve *protection caps* in place when cylinders are not in use
- Light flames according to manufacturer instructions

GMAW or Wire Welders

GMAW welders are used extensively in automotive repair shops today. In fact, a mechanical shop could not exist without them. This is because heat from the acetylene torches takes too long to build up for welding the new high-carbon and high-strength metals in today's lightweight cars.

In contrast, the GMAW welder uses *electricity* to *create an instant heat* in a very small area. Although there is nothing to catch fire, as with the acetylene welders just discussed, there are very different hazards with GMAW equipment. They are:

- Eye injuries - The extreme brilliance of the light generated by the welder can burn the retina.
- Sparks and Spatter - The wire welder creates little fountains of flying sparks and small amounts of *molten metal spatter* that can burn an unprotected person and set *small fires* that may not be instantly recognizable.
- Electrical arcing - Gold and silver rings can receive an arc and turn molten. This super-hot molten metal can literally burn fingers off. Even necklaces and metal piercings (such as navel, nipple, nose, etc.) can draw an arc under the wrong circumstances.

Take Necessary Precautions

With both types of welders, have fire prevention materials readily available. Proper *fire extinguishers* should be very close to the person welding, brazing or cutting. Experienced welders will also always have large *squirt bottles of water* to cool the welded area or quickly quench small fires where hot sparks or particles may have landed. Many welders will even keep a bucket of water or hose nearby.

Trained welders always wear the correct protective, fireproof clothing and PPE, with special attention paid to *eye, face and hand protection*. This would include eyewear that has *ultraviolet protection*. They also should use *ear protection*. In addition, if local exhaust ventilation is not adequate or practical, *respiratory equipment* should be used. *Aprons* and *fire-resistant heavy leather gloves* will help protect the hands and clothing.

Trained welders should always have an awareness of what's going on around their personal workspace. *Even shoestrings can catch fire* from the hot bb's of spatter and slag that are byproducts of the welding process!

Specific Information for Your Area

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Summary

Even with training, you can never be too careful around welding equipment. With that in mind, remember the following: Under no circumstance should you use any kind of welding equipment without appropriate training.

When using these tools, make sure you're not wearing anything made of metal and always wear your PPE. If you have any questions or problems, please contact your manager or supervisor.

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Mechanical Safety Blood-borne Pathogens

Learning Objectives:

- Understand the dangers associated with blood-borne pathogens.
- Recognize the potential for disease caused by pathogens.
- Identify different ways to prevent a blood-borne pathogen infection.

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S/P2 Safety and Pollution Prevention

The Risk is Real

Some of the most serious diseases imaginable are passed from person to person by *coming into contact with blood or other bodily fluids from an infected individual*. Health care professionals are well-informed and extremely sensitive to the risks of infection through exposure to disease-causing pathogens that are carried in the blood. It is important, because of the risk of exposure to blood-borne pathogens that exists in the automotive repair industry, that *you* have an understanding and an awareness of *what the risks are* and *how to avoid them*.

The word "pathogen" sounds intimidating, but in fact, it's just a way of describing a disease-causing agent like bacteria, a virus, or other types of micro-organisms. Although the opportunities for exposure in the automotive repair industry can't compare to those that exist in the medical profession, it is still safe to say that, at some point in their career, *every automotive worker will find themselves in a situation where they need to know how to handle a blood-borne pathogen*.

keep in mind

The number one thing to remember is this: Treat all bodily fluids as if they contain disease-carrying pathogens.

How Does it Happen?

Vehicles damaged in accidents where injury or death occurred are the most likely place for exposure. The resulting blood, small pieces of tissue or other fluids that are in and on the vehicle could *potentially* contain harmful pathogens. The *most dangerous* and most *highly infectious* pathogens are:

- *HIV* which can lead to *AIDS*
- The *Hepatitis B Virus*

Exposure Control Plan

Because your employer wants you to know what to do if you come into contact with blood-borne pathogens in your shop, and because it is required by the Occupational Safety and Health Administration, there should be an Exposure Control Plan in place for the benefit of you and your co-workers. Please take the time to read it carefully to help protect yourself and others from infection. (Note: CCAR has created a generic control plan that may be used for your facility. It can be found in the supervisor's course.)

Who is at Risk?

As stated earlier in this course, the risks of contact are not high in the automotive industry, particularly when compared to the health care industry. The risks do exist, however. The following jobs in the automotive industry are at the highest risk to come in contact with blood or other bodily fluids:

- Technicians
- Auto recycler (salvage) dis-assembler
- Insurance claims staffs
- Airbag technicians
- Technicians working inside accident vehicles on airbags, seat belts, steering wheels and interiors

The common thread with all the jobs listed above is that they are all professions involved with handling, repairing or recycling vehicles after accidents, where blood or other bodily fluids from a victim has contaminated the vehicle. *There are hundreds of thousands of accidents each year*, and in each case, the risk of infection exists. There are, however, *even more common ways* to come in contact with blood at your shop.

Potential Blood-borne Pathogen Contact

Some people have a difficult time visualizing just how day-to-day contamination might occur. Here are three very common ways that you could come into contact with bodily fluids and would need to know and use appropriate procedures:

- A worker gets a nasty cut and asks you to help clean and bandage the wound
- A co-worker who is a diabetic forgets and leaves an unprotected syringe in the restroom
- A co-worker bumps into a sharp edge of sheet metal which penetrates the skin

Clearly, the chance of exposure is more likely than one might think. The good news is that by using proper procedures, the risk of your becoming infected can be minimized significantly.

Handling Blood or Bodily Fluids

If you will use the following precautions, you significantly reduce your chances of becoming infected through blood-borne pathogens:

- Immediately put on *protective gloves and glasses* before coming in contact with fluids or dried blood
- Treat all bodily fluids, *including dried blood residues*, as if they are potentially hazardous
- If you get blood or fluids on your skin, *wash thoroughly with soap and hot water* as soon as possible
- Put on a surgical style particle mask or a respirator and glasses to prevent infection from airborne blood or bodily fluids that can be transmitted through sneezing, coughing or from someone with a bloody nose

The First Aid Kit is Everyone's Responsibility

Every automotive repair shop is equipped with a First Aid kit. Help make sure that your company's First Aid materials are restocked and replenished after use. Notify your company to refill the kit if YOU take something from the supply. Don't hide your own injury if blood is involved, notify your supervisor.

Handling Contamination

In addition to the risk involved in the initial contact with blood or bodily fluids, there is also the disposal of items used in the cleanup process to consider. Take the following steps when disposing of contaminated materials:

- Clean blood with proper disinfectants
- Dispose of contaminated sharp objects including sheet metal, glass, etc., in such a way they will not come in contact again with others
- Separate contaminated clothing such as uniforms into plastic bags and label "*Clothing Contains Blood*" on the bag
- Dispose of gloves by *turning them inside out and wrapping them in a protective bag* before discarding
- Wash your hands, arms and face thoroughly with soap and water after cleanup

Should you come to work *with an open cut or wound*, you will need to be particularly careful when handling contamination. If your open cut or wound is ever exposed to contamination, an *antimicrobial surgical hand scrub* should be used as soon as possible. Also, *notify your supervisor and contact a doctor* as soon as possible.

Employers Provide PPE

Employers are required to provide, and employees are required to use, appropriate personal protective equipment. Examples are latex, nitrile, or vinyl gloves which are all appropriate for working around blood-borne pathogens. For cleaning up glass or sharp objects that may have blood on them, it is best to use protective nitrile-type gloves *under* heavier work gloves to reduce the risk of puncturing the nitrile gloves.

keep in mind

When working with gloves, keep in mind this important point: Never use protective gloves more than once, nor try to clean them!

Reusable clothing, such as *washable* work gloves and uniforms, should be washed using a normal laundry cycle, according to the instructions of detergent and machine manufacturers. *Non-washable* clothing or gloves should be *discarded*. Protective devices including masks and eye and face protection should be *removed and decontaminated* before reusing.

Handling Droplets or Pools

While wearing gloves and safety glasses, droplets or splatter can be cleaned up relatively easily by wiping up with a rag dampened with a disinfectant. Re-wipe with a fresh clean rag with more disinfectant until no signs are visible.

For larger drops or pools of blood, cleanup will take longer and will involve more details:

- Cover any pools of blood with paper towels
- Pour concentrated disinfectant around spill, allowing it to mix with the spill
- Allow at least 20 minutes contact time
- Carefully pick up towels and place in containers or plastic bags

Beware of Glass Shards

Accident vehicles that are being repaired and have broken glass shards are difficult to clean. Small slivers of contaminated glass can easily find their way into the air conditioning/heating vent system. The first time the system is used after the accident or cleaned after the accident, glass that may contain blood will be blown out. If a technician or detail person is operating the system or attempting to blow glass shards out of the vents, they should put on protective equipment, including:

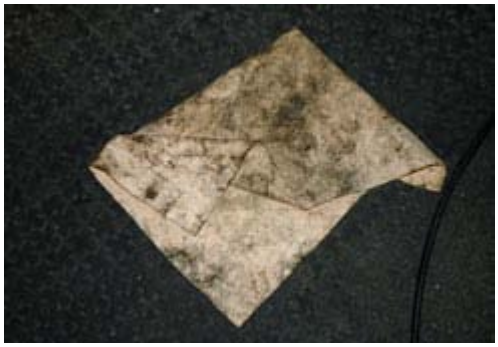
- Protective eye wear
- Respirator
- Work gloves

Disinfectants

Disinfectants are very effective in the cleanup of blood or other bodily fluids because they kill the viruses and bacteria so they are no longer harmful. Be sure to keep an adequate supply on hand, and know precisely where you can find them, so that you might quickly clean, significantly reducing the risk of contamination. The most common disinfectants are:

- Chlorine - such as any *common laundry bleach*. Use it mixed with water in a 10 to one ratio (10 parts water to one part bleach). Be sure, however, to use protective gloves and glasses; it's a strong irritant, but it *kills most bacteria and viruses*. Also, use caution because it is *corrosive to metal* surfaces.
- Alcohols - either ethyl or isopropyl alcohol. Again, use straight out of the bottle. It has *75 to 80 percent alcohol concentration* and is a good general purpose disinfectant.

Sterilizing and Disinfecting Vehicles and Equipment



Although this procedure is relatively simple in most cases, it is important to understand how different types of disinfectants affect different materials in a vehicle. For example, on hard plastic and vinyl items, blood may be washed off with soap and water.

If there is extensive dried blood, you may use bleach or a solution of bleach. Remember, however, that bleach is *corrosive and may stain some plastics*, so experiment with a small area that does not show before wiping a large area and doing damage. Be aware that bleach *will stain cloth interiors*. If you find in experimenting with bleach that it damages a small area, you may try a sterilant or disinfectant which effectively cleanup the material in question, but will not do damage.

Sterilizing and Disinfecting Vehicles and Equipment (Continued)

Sterilants/disinfectants are liquid chemical agents registered with the Food and Drug Administration as a "sterilant/disinfectant." Their use should be followed by aseptic rinsing with water and drying. If the words "sterilant/disinfectant" and the word "sporicidal," (kills spores) are on the label, you can use the chemical for either *sterilization or high-level disinfection*. Be sure to follow the instructions on the label regarding appropriate contact times, temperature and concentration.

You can use bleach or sterilants/disinfectants to clean equipment such as face masks and respirators as well. First read the manufacturer's directions, then try a small spot to make sure it doesn't damage the surface. Finish cleaning with common soap and water.

Hepatitis B Vaccinations - 10 Days

Laws require Hepatitis B Vaccinations to be made available within 10 working days to all employees who have occupational exposure to pathogens at no cost to the employee. These shots are to be given at a reasonable time and place, under the supervision of a licensed physician/licensed healthcare professional, and according to the latest recommendations of the U.S. Public Health Service (USPHS).

If you have had a pathogen exposure, prescreening may not be required as a condition of receiving the vaccine. Employees must sign a waiver if they choose not to be vaccinated, but may later opt to receive the vaccine at no cost. Should booster doses be recommended by the USPHS, employees must be offered them, again at no cost.

Hepatitis B Vaccinations (Continued)

When assigned to a job where you *might* be exposed to pathogens, you should be offered the Hepatitis B Vaccination if you have not already had it. The vaccine consists of three shots, administered:

- Within 10 working days of assignment
- One month later
- And six months later

For more information on the Hepatitis B Vaccination, talk to your supervisor, a licensed physician or health care professional.

Post-Exposure Evaluation and Follow-Up

New laws make available to all employees who have had an exposure incident a *post-exposure evaluation*. The laboratory tests will be conducted by an accredited laboratory at no cost to the employee.

If you decide that you want a doctor to evaluate you, the company must provide a *confidential medical evaluation*. You can expect to be asked *how the circumstances of exposure occurred*, and you may *identify and also test the source individual* if feasible. This means that you may request testing the exposed employee's blood if he/she consents. All diagnoses must remain confidential.

Specific Information for Your Area

To our knowledge, federal laws and guidelines are all that currently apply in your state. If you are aware of any other state laws or regulations not included in this training, please notify CCAR immediately (888.476.5465). Your assistance is appreciated.

Summary

Clearly, there are dangers present for automotive repair workers involving blood-borne pathogens. Fortunately, there are different ways to prevent a blood-borne pathogen infection. Here are a few key tips to keep in mind:

- Treat any blood or bodily fluids with care and always use protective gloves and glasses
- Never use protective gloves twice or try to clean them
- After cleaning up blood or other fluids wash thoroughly with soap and water
- Keeping the First Aid kit properly stocked is everybody's responsibility
- Laws require Hepatitis B Vaccinations to be made available within 10 working days to all employees who have occupational exposure to pathogens at no cost to the employee

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Mechanical Safety Operating Vehicles

Learning Objectives:

- Understand your responsibilities while driving a motor vehicle for your company.
- Recognize the "4 A's of Defensive Driving."
- Identify the significance of the "No Zone."

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Representing Your Company

Your position as an employee in the automotive repair industry places you in a very unique situation. Anything you do as you go about your work behind the wheel of either your own car or a company-owned vehicle reflects directly upon your employer. If you were to be involved in an accident or cited for excessive speeding, the newspaper article would no doubt begin something like this: "John Smith, an employee of ABC Automotive Repair, was involved in a head-on collision yesterday on....."

Whether it's right or wrong, your role as an employee in the automotive industry means that your driving abilities will be scrutinized at a much closer level than, for example, someone who works in a book store or a restaurant. You are an automotive professional and people will assume that you should be a good driver. Clearly, the impact of everything you do behind the wheel during the course of your workday is magnified because of the industry you work in.

High Expectations, High Risk

Perhaps this increased scrutiny is justified because the truth is, in the automotive industry, we have people operating vehicles all the time. With that being the case, the odds are that, sooner or later, a person in your company will have an auto accident while on the job. Why?

- Auto and body technicians road test cars daily
- Service advisers are constantly driving vehicles to determine problems
- Insurance claims representatives travel from place to place daily
- Dealerships are transporting cars constantly
- Parts providers have delivery specialists bringing parts to shops everywhere

These are all activities that are taking place on public thoroughfares, but in the automotive industry, there is additional risk because technicians are constantly moving cars on and off the street and in and out of stalls at repair facilities. Accidents can happen just as easily in the shop as on the road.

Don't Underestimate the Risks

In your type of business, because there are so many people who are *operating vehicles* as a part of their job, *the risk is even higher*. Although you may think that the likelihood of being involved in a work-related auto accident is minimal because the vast majority of your driving will be done in or near your community, the facts indicate otherwise. *The truth is that your chances of being involved in a car crash close to home are much greater than drivers making long trips.*

According to the National Automobile Dealers Association, most accidents occur within 25 miles of our homes, and at speeds under 45 miles per hour. Motor vehicle crashes are the number one cause of work-related fatalities in the United States.

Given these statistics, you need to be at your very best when driving your vehicle, and that starts before the wheels even begin to move.

Before you Begin Driving

Here is the seven point pre-start checklist recommended by the National Safety Council for all drivers:

1. **Buckle seatbelts and make sure they're properly fastened** - During the last 20 years, an estimated 157,500 lives have been saved by safety belts.
2. **Adjust mirrors** - Three out of ten NSC survey respondents do not adjust their mirrors before short driving trips (two hours or less), even though this is when it is more likely you will get in a crash.
3. **Position seat and head restraints** - Positioning your head restraints correctly can reduce whiplash injuries resulting from crashes by 28.3 percent.
4. **Secure loose objects** - Only 34 percent of NSC survey respondents regularly secure loose objects in their cars, even though, on average, loose items ranging from luggage to soda pop cans are responsible for 13,000 injuries in accidents nationwide in just one year.
5. **Turn off cell phones** - During the last five years alone, nearly 300,000 drivers have been involved in crashes attributed to cell phone use (*cell phones will be covered in greater detail later in our course*).
6. **Look for engine warning lights** - Three out of four respondents said they always check to see if their check engine light is on, however, many admitted to checking the light while already driving.
7. **Check your fuel level** - In preparing for a trip, large or small, it's necessary to ensure you have enough gasoline in your tank to get there and back. Twenty-five percent of survey respondents said they do not check their gas level prior to departure.

** Statistics provided by the National Safety Council*

Obey the Law - Fasten Your Seat Belt

It makes no difference where you get your statistics - seat belts save lives. As someone who works in the automotive repair industry, you get to see on a regular basis what vehicles involved in accidents look like. It's not a pretty sight! Armed with that knowledge and knowing the statistics, *there is no excuse for you not to be wearing a seat belt*, regardless of whether you're the driver or a passenger in a vehicle.

Every day of the year, stories in the newspaper and on television tell us about traffic fatalities that could have easily been avoided if the driver or passenger had just worn their seat belt. In most states, having your seat belt fastened is required by law; so if you are not buckled up, not only are you at risk of injury should an accident occur, you are in violation of the law as well. Remember: Click it or Ticket!

Zero Tolerance: Alcohol and Drugs

You are an automotive repair professional and should conduct yourself in a manner that is appropriate for someone in that profession. That being said, the simple, undisputable facts are:

- There is no place for alcohol or drugs on the job
- There is no place for alcohol or drugs when you are driving a motor vehicle, regardless of whether you are on the job or on your own time
- *There is no place for the use of illegal drugs at any time*

Zero Tolerance (Continued)

If you drink on the job, you risk disciplinary action, up to and including termination of your employment, and you significantly magnify your risk of being involved in an accident that can cause:

- Serious property damage
- Serious injury
- Death

Also, be aware that some over-the-counter and prescription medications, while *perfectly legal* and responsible for making us healthy, do in fact *run the risk of impairing our ability* to drive or operate mechanical equipment. Never drive any vehicle while under the influence of alcohol or drugs.

Drive Responsibly

As an automotive repair professional, what are the things you need to be thinking about as you drive the streets and highways within your community in the course of your work? You should begin with an overall philosophy that governs all the decisions you make behind the wheel: The philosophy of *Defensive Driving*.

Drive Defensively

Most of us have heard these two words from the very first day we sat behind the wheel of a motor vehicle, but when was the last time you really gave any thought to what the phrase means? *To drive defensively means taking proactive measures to avoid accident situations regardless of their potential causes.*

keep in mind

Awareness and not just regarding what is happening with your vehicle, but with all the other vehicles with which you share the road.
Anticipate what other vehicles may do. If you are aware that another vehicle is approaching an intersection at a high rate of speed, for example, what is the likelihood that it will be able to stop in time?
Analyze the situation and determine what the right driving decision will be.
Action - Once you've analyzed a situation, you are in a position to make a decision and take appropriate action to avoid the occurrence of an accident.

Do Not Assume Anything!

When you're behind the wheel, all you can control is your own driving. Other drivers may not be as good at defensive driving as you are. As a result, you need to always remember the following:

- Just because you have the right of way doesn't mean that the other driver is going to yield to you
- Just because the light has turned red doesn't mean the other driver is going to stop
- Just because a sign says "no left turn" doesn't mean the driver approaching the intersection isn't going to turn left anyway

If you are *aware* of your surroundings, try to *anticipate* what the other driver will do, and *analyze* the situation and the ways in which you could respond - then you will take the right *action* to avoid a potentially dangerous situation.

Are You too Close for Comfort?

Most of the driving you do for your job has a sense of urgency surrounding it. Whether you're a service adviser driving vehicles to determine their problems or an auto mechanic or body technician road testing cars, you basically just want to find what you're looking for and get back to the shop. When you're driving in a hurry, however, you run the risk of tailgating the vehicles in front of you.

Don't be in that big of a hurry! Following another vehicle too closely is potentially a very dangerous act, so always be aware of situations that may require you to hit your brakes in a hurry. Be sure to always leave enough room between your vehicle and the one in front of you. No matter what the circumstances are that created the situation, if you hit someone from behind you are going to be considered at fault. Be particularly alert in heavy traffic situations.

Always Follow the Two Second Rule

To be sure that you're not following other vehicles too closely, follow the "two second rule:"

> Pick a fixed landmark and watch the vehicle in front of you pass it
> Count "one thousand and one, one thousand and two," and if you pass the landmark before finishing the eight words, you're following too closely

Also realize that the bigger the vehicle you're driving, the more distance you need to stop. If you are driving a large pick-up truck, SUV or van, a "three second rule" would be even better.

Do You Know About No-Zones?

At some point during most work days, your driving may require you to be on multi-lane highways. If that's the case, you will need to be familiar with the concept of the No-Zone. No-Zones are the areas on *both sides, behind, and in front of large commercial vehicles* where blind spots occur. *Your car is invisible in these No-Zones*. If you can't see the truck driver's mirrors, they probably can't see you.

Be very careful driving around large trucks and remember: *The bigger the vehicle, the larger the No-Zone*. One-third of all accidents between commercial motor vehicles and smaller vehicles occur in the No-Zone areas. Consider the following:

- **Side No Zones** - Don't linger on either side of trucks or buses. If you can't see the driver's face in his or her side-view mirror, he or she can't see you. If they need to make a sudden lane change, you are in danger.
- **Rear No-Zones** - Don't tailgate. Large trucks and buses have an extensive blind spot directly behind them. Not only can they not see you, but you can't see in front of them from that vantage point. If the truck or bus stops suddenly, there is no way you can react in time to avoid an accident.
- **Front No-Zones** - Pass very carefully and safely. Never cut in front too soon after passing. Truck and bus drivers need nearly twice the time and room to stop as cars do. The rule of thumb when passing is to wait until you can see both truck or bus headlights in your rear-view mirror before pulling in front. Also, be sure to use your turn signal to let the trucker or bus driver know you intend to pass or change lanes.

Slow Down in Construction Zones

It's virtually impossible to drive through most cities today without encountering some kind of road construction zone. The best thing for you would be to avoid them if possible, but if there is road work going on near your shop, it may be unavoidable.

If you must drive in construction zones, keep your eyes open and obey the signs that will be posted prior to and throughout the work area designating appropriate speeds. You will need to:

- Adjust your speed accordingly
- Leave plenty of distance between your own and other vehicles
- Always be prepared for the unexpected

Statistics tell the story best. The Federal Highway Administration reports that the number of people killed in motor vehicle crashes in work zones rose from 693 in 1997 to 1,181 in 2002. In addition to the fatalities, more than 40,000 people are injured each year in motor vehicle work zone crashes.

Not only is the risk for accidents greater in a work zone, but the amount of a fine can double or triple. Clearly, excessive speed around construction can be costly in more ways than one!

Stay Off the Phone

Most people today carry cell phones. In fact, your employer may even provide you with a cell phone so that you can communicate with them when you are out on the streets on company business. There is no doubt that cell phones have proven to be a wonderful communication tool, and each year the number of cell phones in use increases.

- As of August 2002, research by the Cellular Telecommunications and Internet Association showed 137 million cell phones in use
- A 1997 article published in the "New England Journal of Medicine" linked the use of cell phones in motor vehicles to a *quadrupled risk of collision*

As the statistic above indicates, despite the benefits that cell phones provide, there are significant risks associated with them. As with anything that *takes your attention off of the road*, cell phones increase the risk of accidents. The bottom line is that *anything that distracts your attention from the road is potentially dangerous*. Although not a fail-safe method, the use of a hands-free type of phone will at least reduce the risk to some degree. The safest bet, however, is to avoid the use of cell phones while behind the wheel of a car.

If you need to make a call, the best thing to do is to pull off the road to conduct the conversation. It's also important that you know your state's regulations. In many states, the use of cell phones while driving is strictly prohibited and could result in fines. Also, check with your employer to see if they have rules that limit cell phone use while operating a vehicle for business purposes.

Road Rage

Occasionally, you might find yourself in unpleasant situations involving abusive gestures or language from another driver who takes issue with how you drive. Anxiety and frustration can quickly spark an aggressive or careless driver who tailgates, speeds or fails to yield the right of way among other behaviors.

Aggressive driving behavior has led to incidents of road rage where people have been threatened, harmed or subjected to retaliatory actions by angry motorists. It is imperative that you maintain your composure.

Road Rage (Continued)

When people drive responsibly, they reduce the chances of conflict on the road and help make our roads safer. Experts recommend the following tips to help avoid road conflicts:

Make a conscious decision not to take your personal problems with you when driving.
Drive in a courteous and considerate manner. Give way at busy intersections and where traffic lanes merge. Always signal before turning.
Don't compete or retaliate. If someone's driving annoys you, don't try to educate them. Leave traffic enforcement to the police.
Don't take other drivers' mistakes personally.
Avoid honking your horn unless absolutely necessary.
Say "sorry," if you make a mistake. An apology can reduce the risk of conflict.
If you think you are being followed, do not drive home. Go to a police station or a busy public place.

Specific Information for Your Area

To our knowledge, federal laws and guidelines are all that currently apply in your state. If you are aware of any other state laws or regulations not included in this training, please notify CCAR immediately (888.476.5465). Your assistance is appreciated.

Summary

You have a responsibility to yourself, to your employer, and as a professional in the automotive repair industry to drive in the safest possible manner. So remember:

- Go through your pre-drive checklist
- Buckle up!
- Never drive under the influence of alcohol or drugs
- Practice defensive driving, remembering the 4 A's:
    - **A**wareness
    - **A**nticipation
    - **A**nalysis
    - **A**ction
- Limit or eliminate your use of cell phones while operating a vehicle
- Be aware of No-Zones
- Don't practice *or* allow yourself to become a victim of road rage
- Keep a safe distance between yourself and other vehicles
- Slow down in construction zones

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Mechanical Safety Jump Starting

Learning Objectives:

- Identify the steps involved in jump starting a vehicle.
- Recognize the inherent dangers involved when jump starting.

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What is Jump-Starting?

Jump-starting is the procedure used to start a car or truck engine that has either a weak or a discharged battery by connecting it to another vehicle's battery using jumper cables (aka booster cables). Most people think of it as a rather simple process. While this may be true, it's important that you understand there are some inherent risks involved.

What are the Risks?

There are several potentially dangerous situations that can develop when jump starting a vehicle. First, there is a risk that the battery could *explode*. While the explosion itself could cause serious injury, there is also the fact that batteries contain a combination of *water and sulfuric acid* which could cause serious burns to your skin and irreparable injury to your eyes. Because of that risk, the following recommendations are offered:

Wear protective eyewear when jump-starting any vehicle
Never lean over the battery when jump-starting a vehicle
Never jump start a battery that is cracked or has obvious leaks; if this is the case, the battery should be *replaced*, not recharged!

In addition to these risks to you personally, there are risks to the vehicle as well, as you'll learn on the next page.

What are the Risks? (Continued)

Before attempting to jump start a vehicle, make certain that headlights, blinkers, air conditioning, radio, CD player, navigational devices and any other type of electronic equipment are turned off. Jump starting can send *high voltage coursing through your vehicles electrical system*, which can potentially damage or even destroy any of these devices.

keep in mind

Also make certain that both vehicles' transmissions are placed in park or neutral if the vehicle has a manual transmission. Remember to put the emergency brake on when the car is in neutral to prevent any vehicle movement during the jump-starting process.

How is it Done?

The steps involved in the jump-starting process are very simple:

- Attach one end of one jumper cable to the positive* (usually marked "+") terminal of the *stalled* vehicle.
- Attach the other end of *that same cable* to the positive terminal of the *starting* vehicle's battery.
- Attach one end of the *other* jumper cable to the negative* (usually marked "-") terminal of the *starting* vehicle.
- Attach the other end of the second cable to some type of ground (at a minimum of 12 inches away from the battery) on the stalled vehicle. This can be any unpainted metal surface or bolt on the stalled vehicle.
- *Do not connect directly to the negative post of the weakened battery. Doing so could cause sparks and possibly an explosion.*
- Do a final inspection to make sure the cables are connected correctly and that they are not coming into contact with any moving parts, such as fans or belts.
- Start the vehicle with the good battery. Let the engine idle for a few minutes before you attempt to start the stalled vehicle, giving the stalled battery ample time to charge.
- Attempt to start the stalled vehicle, letting the starter run *no more than 20 seconds*. If it doesn't start after 20 seconds, stop and wait a few minutes before attempting it again.

*Some cables will actually be marked positive(+) and negative(-). Just remember "positive to positive, negative to ground" and you're likely to avoid any difficulty.

Once the Vehicle is Started

Once the vehicle has been successfully started, *remove the cables in the opposite order from which you connected them*. Make sure that the clamps do not touch each other or any part of the car to avoid sparks and that the jumper cables do not get caught in moving parts, which could damage the cables, the car or both. Be certain to use as much caution removing the cables as you did applying them.

Specific Information for Your Area

To our knowledge, federal laws and guidelines are all that currently apply in your state. If you are aware of any other state laws or regulations not included in this training, please notify CCAR immediately (888.476.5465). Your assistance is appreciated.

Summary

At some point in every technician's career, they will jump-start a vehicle. While it is not a difficult process, there are inherent risks involved that make it important for you to know how to do it properly. Commit the steps you've learned in this course to memory and you should be able to charge a stalled battery with relative ease.

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Mechanical Safety Violence in the Workplace

Learning Objectives:

- Identify the levels/types of workplace violence.
- Recognize behaviors and attitudes that may precede acts of workplace violence.
- Understand the steps that need to be taken if you perceive a threat or become a victim of violence.

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"I Never Thought it Could Happen Here"

Most of us go to work every day without fearing for our safety, and yet on a far too regular basis, newspaper headlines and TV news anchors report incidents of people suffering injury and even death at the hands of co-workers, family, clients or acquaintances. Despite these reports, many of us struggle to comprehend the idea of someone coming to our workplace and doing harm to us.

With all of the statistics and publicity that surround workplace violence, it just makes sense that all employers should have documented programs in place to both *reduce the risk of violence occurring in their workplace and provide a method for employees to report incidents of violence should they occur*.

To prepare yourself as an individual for the possibilities that exist, you need to be aware of:

- The levels/types of workplace violence
- The warning signs of potential violence
- Knowledge of your employer's program for preventing and/or dealing with acts of workplace violence

What Can Be Considered Violence?

When we think of workplace violence, most of us think of those more highly publicized types mentioned earlier; specifically, the physical attacks that result in serious injury or death. In fact, there are many different actions that fall into a complete definition of the subject. This would include things such as:

- **Threatening behavior** - Behavior such as getting in someone's face, destroying or throwing objects, shaking fists, etc.
- **Harassment** - Which would include any type of activity that frightens, belittles, intimidates, aggravates, causes concern or verbally abuses a person; this could be in the form of words, actions or any type of intimidation or bullying
- **Verbal abuse** - Actions such as swearing at, insulting or using condescending language towards a person falls into this category
- **Physical attacks** - Hitting, kicking, shoving, pushing, grabbing or spitting on someone

It is important that *any* of these behaviors be addressed. Ignoring threats or bullying can allow a situation to *build up to a point where physical injury can occur*.

It's also important to realize that even though media coverage of workplace violence tends to focus on people being attacked by co-workers, there are several different categories in which violence might occur. Keep in mind that although the majority of *fatal* injuries occur at the hands of strangers, most workplace violence is committed by someone the victim knows.

Violence by Co-workers

Co-worker violence involves *being verbally threatened, threatening behavior or an actual physical assault*. It can be done by someone who has some employment-related connection to the workplace which may include either a current or former employee, or even a supervisor or manager.

As we stated earlier in the course, people generally tend to think "it could never happen here." The fact is *any workplace can be at risk of a violent act being committed by a co-worker*. In this situation, the act is usually *triggered by a desire for revenge for what the individual perceives as some manner of unfair treatment*.

Although this perception of unfairness is the *trigger*, there will typically be other factors creating stress in the individual's life that leads them to the point of violence. Although this is the most highly publicized type of workplace violence, it accounts for far *fewer workplace fatalities* than violence perpetrated by strangers.

Trust Your Instincts

One of the things that you often hear from victims of workplace violence is that there were indications that something wasn't right about the circumstances leading up to the incident. Unfortunately, many who said that they ignored those warning signals were ignoring their instincts and wound up being hurt as a result.

Learning to trust your instincts is important in preventing workplace violence.

If you feel you are being threatened by another employee, client, co-worker, family member, friend or acquaintance, do not hesitate to report it to a supervisor or manager. Trust your instincts, because knowing that you failed to act to prevent harm to yourself or a co-worker is a heavy burden to have to bear.

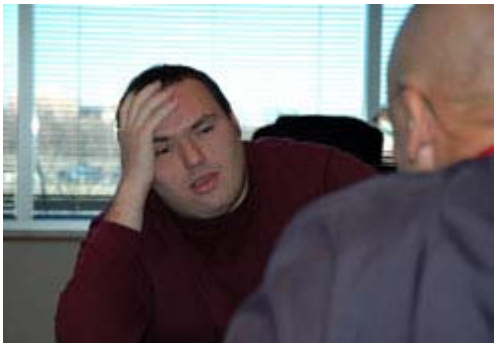
What are the Behavioral Signs?

What do people mean when they say "something wasn't right?" People who commit violence will typically exhibit one or more of these types of behaviors:

- Blames others for their own problems; does not take responsibility for his or her own actions
- Constantly challenges authority
- Withdraws from normal activities with family, friends or other co-workers
- Intimidates and verbally abuses; tends to harass and intimidate others
- Is upset over recent events at work
- Demonstrates a recent change in behavior, appearance and demeanor
- Abuses drugs and/or alcohol
- Displays obsessive romantic attention
- Stalks the intended victim

What Are the Behavioral Signs? (Continued)

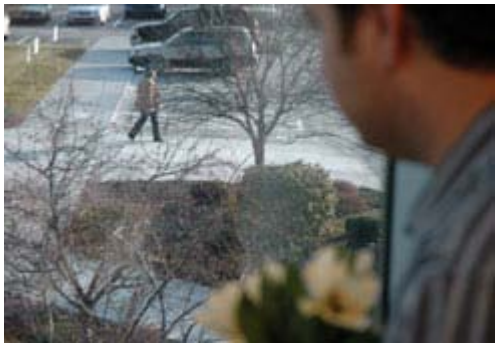
Here are some additional signs that might indicate a potential for violence:



- Makes reference to other incidents of violence
- Overtly threatens to harm themself or others
- Has a fascination with and ownership of weapons
- Has a known history of violent behavior
- Has admitted to other acts of violence
- Swearing, particularly at others
- Has an inability to control his or her temper
- Demonstrates repeated incidents of irrational behavior
- Destroys his or her own property

What Are the Characteristics?

Below are some of the *characteristics* identified in perpetrators of workplace violence:



- Considered to be a loner
- Displays self-righteous or morally superior behavior
- Feels they are above the rules; refuses to take criticism regarding work performance
- Feels humiliated and degraded; has been wronged by the victim
- Blames others for their personal problems
- Brooding and sullen
- Has suicidal tendencies
- Control freak
- Argumentative

Steps for Limiting Violence by Co-workers

There are things that can be done to minimize the risk of violence by co-workers occurring in your facility. The following things can be done to prevent or minimize violence from an internal source:

- **Doing background checks on all prospective employees** - Any hiring decision should always involve checking an individual's employment references. A more thorough check would include a drug screening and a criminal background check. There are people without drug problems or a history of violent behavior that commit violent acts on co-workers, but *having an awareness of drug use and knowledge of violence in a prospective employee's past* can help you avoid hiring someone who would bring known risk factors into your workplace.
- **Making it known that violence of any kind will not be tolerated in your workplace** - It is important that all employees are made aware that *even the threat of violence will not be tolerated*. Consequently, *any act of intimidation, bullying or harassment will be considered a violent* act and will subject the perpetrator to disciplinary action, including termination of their employment.

Steps for Limiting Violence by Co-workers (Continued)

- **Taking ALL threats of violence seriously** - In some organizations, employees will not report suspicious behavior for fear that they will be ignored or not taken seriously. The behaviors and attitudes that we identified as suspicious earlier in this course don't necessarily mean that an individual will commit an act of violence, but you should still *report all suspicious behavior that occurs*. It is essential that employers step up in matters relating to employee violence and do a thorough investigation into the details surrounding any incident. Being extra cautious is the best approach to take.
- **Seeking the help of professionals before terminating a potentially violent employee** - If you feel that there is a possibility that terminating an employee might result in violence, contact your local law enforcement officials. If you have any concerns about an employee's reaction to receiving news of their termination, it is better to use caution and have help nearby.
- **Taking immediate action if an employee exhibits any kind of bizarre or suspicious behavior** - Intervention early in the cycle of violence can prevent more serious problems from happening. It may be that a reasonable suspicion of a drug problem could justify requiring an employee to submit to drug testing.

Be Mindful of Triggers

While an individual can have a history of abusive or violent behavior, not everyone will resort to inflicting serious bodily harm or deadly force on others. When overt acts of violence do occur, however, there has typically been some type of emotional trigger that pushes the individual over the edge and motivates them to use violence. Triggering events can include, but are not limited to:

- Termination of employment
- Divorce papers or the ending of a romantic relationship
- Financial problems
- Alcoholism
- Drug use
- Extreme stress

A violent act may not come directly on the heels of the triggering event, but there may be an escalation of the behaviors and attitudes discussed earlier in the course that may be obvious to others and should definitely be brought to the attention of a manager or supervisor.

Threats From the Outside

Up to this point, this course has primarily dealt with threats from *inside* an organization. In some respects, these threats are easier to prepare for due to the fact that the attitudes and behaviors of a co-worker are visible to everyone working with or around them. As a result, more opportunities are likely to exist for individuals to speak up and start an intervention of some type. Violence originating from external sources can sometimes be more difficult to anticipate.

Violence by Someone with a Personal Relationship to the Employee

Violence of a *personal* nature is committed by an assailant who has some *personal relationship* with the employee outside of the workplace. This could include:

- A current or former spouse
- A lover
- A relative
- A friend
- An acquaintance

This type of violence is typically driven by some real or perceived difficulties or problems in the relationship, or by *psychological issues the assailant may be experiencing*.

Although this type of violence accounts for a much smaller number of the fatal workplace injuries compared to violence by strangers, *the fact that someone would show up at an individual's workplace to confront them should be considered a serious warning sign* and should never be ignored. And, while workplace violence is committed by both males and females, violence that develops out of a male and female relationship will typically will be male-on-female in nature.

Violence by Customers

Violence by customers involves things such as being *verbally threatened, threatening behavior or physical assaults* by someone who has received service from your facility, or is in need of receiving service.

Many times, people who come into your shop or call on the phone are angry about a situation, and while being angry does not necessarily mean they will resort to violence, it is a behavior that should not be ignored.

did you know?

Fortunately, most angry people can be calmed down by practicing good customer service skills. If, however, you ever feel, *even in the slightest way*, that you are being threatened or at risk of physical harm, you should report the situation and involve a supervisor as quickly as possible.

Limiting Access

One of the best ways to protect your workplace from violence from outside your organization is by *restricting public access to work areas*. This can be accomplished in a variety of different ways. One of the best options is to install locks that require anyone entering to use a picture ID card that must be successfully swiped through a magnetic stripe reader before access is allowed.

A less costly option would be to install combination locks on all doors that access staff-only areas. There are locks available that can have the combination changed so that not only are outsiders prevented from re-entering, but former employees would be barred as well. If this type of system is used, it's wise to change the combination on a regular basis, particularly *every time an employee is terminated*.

In environments where there will be legitimate reasons for the public to have access to workers, having a front desk arrangement where security personnel can watch for people who appear to be agitated or exhibiting any type of suspicious behavior is the best option.

Other Steps for Limiting Violence from Outside Sources

Additional methods for limiting violence from outside sources include:

- **Encouraging employees to report incidents of domestic violence and/or threats of violence by customers** - When employees fail to make supervisors aware of domestic abuse that threatens to carry over into the workplace or of threats from customers or clients, they not only put themselves at risk, but potentially all of their co-workers as well. The *ability* to anticipate a possible violent situation *can make the difference* between a successful intervention as opposed to a tragic result.
- **Making use of security cameras** - Once again, having the ability to anticipate a problem situation can reduce the likelihood of a tragic outcome and make intervention easier. If a disgruntled employee, abusive spouse or angry customer has made threats, having the ability to intercept them before they ever get a chance to confront their intended victim makes everyone safer.
- **Providing well-lit parking facilities** - Typically, a criminal is going to choose the path of least resistance when it comes to choosing a victim. A well-lit parking area, particularly one that is equipped with security cameras and possibly even security personnel on duty, is more inclined to discourage someone with criminal intent in mind.

Don't Intervene in an Actual Act of Violence

While it is suggested that you make your supervisor aware of any behaviors you consider suspicious in an individual, *under no circumstances should you attempt to intervene if you are witnessing an event where bodily harm could be inflicted on an individual*.

You put yourself and others at risk if you attempt to disarm an individual with any type of weapon in their possession. Intervention of that type should be left to people who are trained and experienced in that field. There is nothing to be gained by attempting to be a hero. There is a great deal to be lost - possibly your life or that of another person.

Specific Information for Your Area

To our knowledge, federal laws and guidelines are all that currently apply in your state. If you are aware of any other state laws or regulations not included in this training, please notify CCAR immediately (888.476.5465). Your assistance is appreciated.

Summary

Today's news media are quick to remind us of the fact that we live in a violent world. They like to look for people or institutions to blame. Ultimately, however, we are all responsible for our own actions. This is true for the person who commits a violent act, and it is true for each and every one of us.

We're all responsible for having an awareness of the warning signs like those documented in this course. We are also responsible for reporting anything that we consider dangerous or suspicious to our manager or supervisor. While it is impossible to guarantee that any workplace will be 100 percent safe from acts of violence, it is possible to have a plan and for each individual to *follow the suggestions and guidelines outlined in this course*. In so doing, the likelihood that you or someone you know will become a victim of workplace violence is significantly reduced.

Click to Take Exam

Mechanical Safety Chemicals and the MSDs

Learning Objectives:

- Understand what a Material Safety Data Sheet is.
- Recognize how an MSDS is used.
- Identify some of the dangers associated with chemicals used in the automotive industry.

Training Content Provided by

S/P2 Safety and Pollution Prevention

Visiting the Grocery Store

We're going to begin our discussion of chemicals and material safety data sheets in what might seem to be a very unusual place - the grocery store!

Americans, primarily motivated by the baby boomer generation, have become a very health conscious people. It's virtually impossible to walk through a grocery store today without seeing someone examining the *nutrition facts* typically located on the back label of most food products. They are looking at the contents to determine how the following items impact them:

- Calories
- Protein
- Carbohydrates
- Fat
- Sugar
- Sodium

Checking the Label

American eaters are highly conscious of what is in their food, and they study how it affects their weight and their overall well-being. More importantly, some people read the labels because they are diabetic, have food allergies or are on sodium restricted diets due to high blood pressure or other health problems. They want to make sure that they won't become ill or have a negative allergic reaction.

Without the nutrition facts that are listed on the products, a consumer might be forced to make an uninformed decision that could not only make them ill, but possibly cause a severe reaction that could put them into the hospital. Clearly, these labels are on food products to help people have not only a better understanding of what they're buying, but in some instances, keep them from doing serious harm to themselves.

Material Safety Data Sheets

The United States government has passed laws (29 CFR 1910.1200) that require all suppliers to provide content and health information on the chemicals or supplies with which you come in contact. The Occupational Safety and Health Administration requires your employer to make this information available to you in order to make sure you understand the health implications. Like the study of food, you can *review contents and health risks in great depth* on a MSDS before you ever use the product.

keep in mind

Simply stated, an MSDS is to the chemicals and other products you use in your shop as the nutrition label is to the food you eat.

Material Safety Data Sheets (Continued)

This course is not designed to tell you how to handle all of the many chemicals and supplies you may come in contact with in your job. What we can tell you, however, is that *all of the information you need to know is on the MSDS and that the MSDS should be easily accessible* to you in your workplace. We can also tell you that you need to:

- Know the names of the chemicals with which you work
- Know how to handle and store them safely
- Know how to handle them without risking potentially dangerous exposure to them
- Know what would happen to you if you *were* exposed to these chemicals

Any worker who is not knowledgeable on these matters is putting themselves at risk of serious harm.

The Standard Format

ANSI standard Z400.1-1998, "Hazardous Industrial Chemicals-Material Safety Data Sheets-Preparation" is the format that has become the voluntary standard used to construct MSDS's. OSHA *recommends* that the ANSI format be used; however, they *cannot require* it without some changes being made to the federal regulations. As of the writing of this course, those changes had not yet taken place.

The Standard Format (Continued)

Listed below are the 16 sections designated under the ANSI MSDS standard:

1. Substance identity and company contact information
2. Chemical composition and data on components
3. Hazards identification
4. First aid measures
5. Fire-fighting measures
6. Accidental release measures
7. Handling and storage
8. Exposure controls and personal protection
9. Physical and chemical properties
10. Stability and reactivity
11. Toxicological information
12. Ecological information
13. Disposal considerations
14. Transport information
15. Regulations
16. Other information

Information Available all the Time

OSHA requires employers to provide their employees with *detailed information and training* on the chemicals they work with and to *keep the information where it is easy to access*.

The information is provided to you in several ways:

- Labels on the containers of chemicals - these labels will provide you with some information on contents and risks, but not to the level of detail that you will find in the MSDS for the product
- An MSDS for each chemical in use at the worksite - these should be maintained in an *easily accessible* location
- Training sessions on the chemicals you use on the job and how to protect yourself from being harmed by them

Read the Label!

Not only is it in the best interest of your health, it's just good common sense to read the label on a container to see if it may contain a hazardous chemical. The label can provide a lot of useful information, such as:

- Warnings
- Directions on proper usage
- First aid information in case of exposure or an emergency

Working with chemicals does not have to be hazardous to your health, *if you will take the time to familiarize yourself with the products you'll be working with*. With proper handling and with the use of appropriate personal protective equipment, you minimize the risks significantly.

MSDS: More In-Depth Information

The primary difference between the product label and the MSDS is that the MSDS contains a much more detailed level of information than a chemical's product label.

Please bear in mind that the time to become familiar with the information on the MSDS is before you begin working with the chemicals.

You would also want to refer to the sheets to solve other problems, such as what to do in case of leakage or a spill. It is important that you understand that the MSDS may be written in *highly technical language*. The good news is that after you read a few or receive some explanations, they will become much easier to understand.

Health Explanations

Here are some fairly simple explanations of terms that you may see on an MSDS or a label that pertain to your health. These terms will tend to be consistent from one MSDS to the next, so what you learn here should be applicable to any MSDS that you might use:

- ***Acute or chronic effects***: A chemical that is *acutely toxic can injure you after a single exposure*. Alternately, chemicals that have *chronic effects may harm you after repeated or prolonged use*.
- ***Route of entry***: How a chemical may enter the human body - *such as inhaling, swallowing, breathing or through skin absorption*. The possible route of entry is important to know and helps you determine what PPE you should use when handling the substance.
- ***Local or systemic reaction***: There are two ways your body can react when you are exposed to a toxic chemical. You can experience one of the reactions or both reactions at the same time.
    - A *local* reaction will occur at the site of the exposure, such as irritations or damage to the skin, eyes or lungs.
    - A *systemic* reaction occurs when chemicals enter the bloodstream through the skin, eyes, mouth or lungs. Your entire body can be damaged. This means your whole "system" is reacting.

On either local or systemic reactions, the damage can be immediate, or sometimes it is delayed and takes awhile.

Health Explanations (Continued)

- ***Target organs***: *Organs* in your body that are *damaged by a systemic reaction* to a hazardous chemical, such as the liver, heart, lungs or kidneys.
- ***Permissible exposure limit***: Some chemicals present almost no problem unless they come in contact with you for a period of time. Soap is a good example. A common bar of soap is a group of chemicals that you use every day. However, a wet bar of soap held against your skin for a long period, could cause a rash to develop. The PEL measurement will *tell you the average amount of a chemical that you can safely be exposed to over an eight hour period*.
- ***Compatibility***: Toward the end of every MSDS is a section that describes *what chemicals should not be mixed with the material*. For example, *chlorine bleach mixed with ammonia can cause an extremely toxic gas*. If you have any questions about the chemical terminology, check with your supervisor.

Anytime you are unsure about chemicals or supplies, check the MSDS sheet and/or ask your direct supervisor or a knowledgeable coworker who has experience with the proper usage.

New Chemicals or Supplies

The following general precautions should be used around all chemicals:

Never eat, drink or smoke around chemicals in the work area.
Keep flammable and explosive material away from any heat sources.
Make sure there is enough ventilation in the work area; if you feel the slightest amount of dizziness or nausea, *report the incident immediately to your supervisor*.
Use the right personal protective equipment; this may include *gloves, safety glasses, masks, respirators and work clothes*, depending on the type of chemicals you are using. Keep all equipment clean and report any damage.
Know how to *properly dispose* of all contaminated materials.
Always use established procedures *for handling, storing or transporting* hazardous chemicals.

keep in mind

Never start a job without knowing the properties and hazards of new chemical(s) you're working with.

Chemicals Must be Clearly Labeled

All containers for chemicals should be *clearly labeled* with one or more of the following:

- The product name
- Part number
- ID number

They should also be labeled with the *name and address of the manufacturer, importer or distributor*. This information is also available on the MSDS. Labeling is an important issue because some shops buy chemicals in bulk, and then pour them into smaller containers to use them. *Whenever a chemical is dispensed from its original container into a secondary container, the secondary container must be labeled to show the product's name and information.*

Some containers can have leftover residue that could still cause harm or be dangerous. When original containers or secondary containers have been emptied of usable material, they should be *drained, emptied and cleaned* as appropriate for *re-use or disposal*.

Specific Information for Your Area

To our knowledge, federal laws and guidelines are all that currently apply in your state. If you are aware of any other state laws or regulations not included in this training, please notify CCAR immediately (888.476.5465). Your assistance is appreciated.

Summary

Because of the inherent risk involved with the use of many of the chemicals and other products used in an automotive repair facility, you need to make *sure all chemicals in your shop are properly labeled* so you can protect yourself and others around you from those that are hazardous. *If you ever have a question* about a chemical, remember to *consult the product's MSDS*. If you need more assistance, ask your manager or supervisor.

Click to Take Exam

Final Exam

Mechanical Pollution Prevention Introduction

Learning Objectives:

- Identify the top 10 environmental challenges in mechanical repair.
- Understand what a waste stream is.
- Recognize the four waste categories.

Introduction

By its nature, the automotive repair industry puts its employees at risk due to exposure to a variety of pollutants. Of course, none of us wants to be hurt on the job, nor do we want others to be hurt. In an effort to minimize the risks, laws have been passed that require businesses and schools to train their employees and students on safety and pollution prevention issues.

This course contains several modules, each one addressing a different topic related to pollutants in our industry. Each module can be read relatively quickly. At the top of each page you can navigate through the course by using the "Next Page", "Previous Page" and "Previous Module" buttons.

Each module will cover specific safety and pollution prevention practices. You may leave and return to a module at any time. After you have read all the modules, a final exam will test your knowledge of the information presented in each module.

To be successful on the final exam:

- Read all modules before taking the final
- Read each item carefully
- You must correctly answer 80 percent of the questions to pass
- You will have five attempts to pass the course
- After passing the final, print a certificate of completion

Mechanical Repair and Pollution Prevention

Vehicle maintenance and recycling involves handling and managing a wide-variety of materials and waste products. Some of these can be toxic to fish, wildlife and humans when improperly managed. Antifreeze, paint and batteries contain metals and toxins that are extremely hazardous and must be carefully handled to avoid polluting the environment.

Who Needs to Know How to Be Compliant?

The ownership/management of a business is primarily responsible for compliance with the laws protecting our environment. However, *every employee of a shop is considered responsible and may be criminally liable* if they knowingly allow or participate in environmental violations.

Therefore, *every person in an organization needs to understand compliance*. The technicians and painters need to know, because they are dealing with potentially hazardous chemicals and waste every day. The assistants need to know, because they are helping to clean up and dispose of fluids and chemicals. The managers and front office staff need to know, because they deal with the paper work issues and they are the ones who have to bear responsibility should the Environmental Protection Agency investigate a potential violation.

The Top 10 Environmental Challenges

The Top 10 list of environmental challenges in a mechanical repair can help you identify possible sources of pollution. Bear in mind, however, that this list is not all-inclusive. Therefore, you should take it upon yourself to become aware of all sources of hazardous waste within your shop. If ever taken to court for improper disposal of waste, you will find that "not knowing" is not an adequate defense for violating environmental laws. The shop owner, general manager or department manager must *always* make sure that *hazardous waste is disposed of correctly*.

facts and stats

Top 10 Environmental Challenges in Mechanical Repair:

1. Oil & Other Similar Fluids	2. Antifreeze		3. Floor Drains
4. Absorbents and Spills	5. Air Conditioning (Freon)		6. Batteries
7. Asbestos	8. Tires	9. Paint Booth Filters	10. Absorbents and Spills

Waste Stream

Pollution, or waste that is generated from a business, is called a "waste stream."

If something needs to be thrown out, disposed of, taken away or taken off the premises, then it becomes part of the waste stream. Here are some examples of a shop's potential waste stream:

facts and stats

Waste Categories	Related Mechanical Waste
Ignitable	Parts cleaner, rags, acetylene
Reactive	(None obvious or common to mechanical shops)
Corrosive	Broken/damaged batteries
Toxic	Lead, chromium, cadmium, mercury and benzene can be found in antifreeze, thinner, parts cleaner or rags

All hazardous waste generated in a mechanical shop must be considered part of the shop's waste stream. Regardless of the amount of waste stream produced, it is to the shop's legal and financial advantage to manage and dispose of the waste properly. Even more importantly, the use of good techniques will prevent pollution and minimize your shop's waste stream.

National Fire Protection Association Diamond Label

Some states require automotive repair facilities to use the National Fire Protections Association 704 diamond Label system and to have the labels posted outside the workplace. This helps firefighters and employees easily recognize the three main categories which identify hazardous substances stored on the site.
Knowing what is in the building can prevent injury and damage to the environment. The label is color-coded to highlight the different hazards, making it easier to identify the specific risks:

1. Red - Flammability
2. Blue - Health Hazard
3. Yellow - Reactivity
4. White - Special information (such as "W" for Water Reactive or "Oxy" for Oxygen)

The NFiPA 704 system uses a numerical value between 0 and 4 to indicate the level of hazard for that particular chemical. A value of 0 is displayed when there is no hazard and a value of 4 is displayed when there is the highest level of hazard.

Summary

The automotive industry generates more hazardous waste than any other industry in the world. However, the automotive industry *does not have to be the greatest polluter in the world*. It's up to people like you to make a difference. Be aware of the Top 10 environmental challenges in a mechanical repair and do your part to make sure that your shop's waste stream is managed and disposed of properly.

Please take the time to study and learn the information in this course. If you have any questions, refer back to the material. You can make a difference, *starting now*.

Mechanical Pollution Prevention Oil and Similar Fluids

Learning Objectives:

- Identify which fluids can and cannot be mixed with used oil.
- Understand how to properly manage used oil.
- Recognize the proper ways to handle used oil filters.
- Determine the issues concerning accepting used oil from the general public.

Used Oil

Used oil is not always considered hazardous if managed in a prescribed manner. Recently, however, *more than 30 percent* of the states in the United States have designated used oil as a hazardous or special waste. The correct management of waste oil may vary by state; therefore, you should check with your state to find out specific details and to make sure that you are not breaking any laws.

facts and stats

Did you know that the motor oil from one oil change will contaminate one million gallons of drinking water if not properly disposed? National sources estimate that between 95 and 180 million gallons of motor oil are poured into drains, down sewers or thrown away each year; in comparison, the Exxon Valdez oil tanker disaster involved only 10 million gallons of oil spilled off the coast of Alaska.

Similar Fluids May be Combined

As a general rule, you can mix the following fluids with used engine oil for recycling:

- Transmission oil
- Hydraulic fluids
- Synthetic oils
- Cutting oils, gear and petroleum-based cooling oils
- Petroleum-based, non-hazardous lubricating fluids

Non-Similar Fluids

On the other hand, NEVER mix the following with used oil:

- Antifreeze
- Solvents
- Gasoline
- Wastewater
- Unknown wastes

Helpful Tips

Here are some useful ideas for managing used oil:

- Have specific, labeled catch pans available for technicians who are collecting oil
- *Do not use* the containers for antifreeze or other non-similar fluids
- Be prepared for oil spills with the *proper absorbents*
- Spills in your shop and any releases on pavement or outside must be cleaned up immediately
- Spill clean up materials must be disposed of properly

Helpful Tips (Continued)

Here are some more useful ideas for managing used oil:

- Collection drums or containers must be marked "Used Oil," as well as any *piping* that takes used oil to an outside used oil container
- Segregate used oil - *Do not mix used oil with any non-similar fluids*
- Waste containers should be kept in good condition, sheltered, covered tightly and secured from vandalism and tampering
- Inspect used oil containers and piping for leaks or spillage at least weekly
- All used oil should be *sent for re-refining, burnt for energy recovery or disposed of* in any other Environmental Protection Agency or state-approved method

Used Oil Filters

Many mechanical shops don't realize that throwing an *improperly drained oil filter* into the trash dumpster is a violation that can carry heavy penalties. An EPA inspector will always look in the dumpster of a shop during an inspection.

Oil filters are an often overlooked hazardous waste source found in mechanical shops. Typically, body shops only occasionally replace oil filters, while mechanical shops properly recycle oil filters all the time. Mechanics have hot-draining systems, while body shops do not. Many body shops do not know there is a simple and proper procedure for oil filter disposal.

Proper Handling

There are several different ways to handle used oil filters:

- Locate a used oil filter recycler in your area and professionally recycle the filter
- All body shops have relationships with local mechanical shops; you can pay to have a mechanic dispose of the filter properly
- Puncture the oil filter and hot drain for 24 hours

keep in mind

Remember the following points when dealing with used oil:

- Put collected oil in a container marked "Used Oil Only"
- Locate a scrap recycler who will take the used filter
- Check with your solid waste landfill to see if properly drained used oil filters are acceptable

Used Oil From the Public

Accepting used oil from the public may pose potential liabilities for an auto shop owner if the oil is contaminated or not truly used oil. It can result in substantial federal or state fines. Even if the motivation is to perform a community service or good deed, on the whole, mechanical shops should simply avoid assisting people in the disposal of used oil.

If your shop does accept used oil from the public, you should have any person that brings their oil to you sign a form stating that the oil they have brought is only used oil, and it is free from other contaminants. Your shop must then visually inspect the oil to assure that there are no contaminants or use a hand-held detector called a "sniffer" to check the oil for purity. If you have any doubts as to whether the oil is contaminated, you should not accept it.

Service Station Dealer Exemption

SSDE is a program that is run under the federal EPA Superfund law. The SSDE is intended to encourage service station dealers to accept, for recycling, used motor oil from Do-It-Yourselfer recyclers. You may be eligible for the SSDE if you:

- Are or were a service station dealer
- Collected DIY used oil
- Transported or sent the DIY used oil to the Superfund site after March 8, 1993
- Did not mix hazardous substances with used oil generated or collected by your facility
- Complied with the EPA's used oil management standards found in the Code of Federal Regulations

Oil and Water Separators

If your shop is connected to a municipal sewer system, chances are very good that you have an oil/water separator installed within the floor drain system.

Oil/water separators are no substitute for spill containment, but they do reduce residual contamination. Follow the manufacturer's recommendations for maintenance and clean out the separator regularly to operate at maximum efficiency.

Summary

Used oil requirements call for special handling. Make sure you know which fluids can and cannot be mixed with used oil, how to properly manage used oil, how to handle used oil filters and the rules for accepting used oil from the general public. Common sense and good management practices are all that is required to comply.

Mechanical Pollution Prevention Antifreeze

Learning Objectives:

- Recognize proper antifreeze disposal methods.
- Understand antifreeze collection and storage.
- Identify the three ways to recycle antifreeze.

Introduction

Mechanical shops are constantly replacing or removing damaged radiators to repair other parts of an automobile. Because of that fact, it is critical that the antifreeze in theses radiators be handled appropriately. The hazardous component in most antifreeze is ethylene glycol, and it is *extremely toxic* to humans and animals.

Although un-used antifreeze is not at this time considered a hazardous waste by the Environmental Protection Agency, some states are enacting laws that are different than federal laws, so be aware of what your state demands.

Health Questions about Ethylene Glycol and Propylene Glycol
(Source: Agency for Toxic Substances and Disease Registry, U.S. Dept. of Health and Human Services)

Used Antifreeze

Used antifreeze, on the other hand, is a different story. Used antifreeze may contain high levels of heavy metals such as lead from the solder in the radiator, or *cadmium* or *chrome* from the internal moving parts of the engine. *Benzene* has been detected in antifreeze due to engine blow-by in the head gasket area.

If your antifreeze becomes contaminated by *mixing any other materials* with it, then the *antifreeze is considered hazardous waste*. It is expensive and impractical to test antifreeze from each radiator, so it is recommended that you simply keep it separated and *treat all used antifreeze as hazardous waste*.

Antifreeze should not be disposed of by throwing it in the trash, mixing with oil or paint waste or pouring into drains or septic systems. Storm sewers may empty directly into ponds or streams. *Waste antifreeze can destroy the microorganisms that decompose septic waste*.

Things to Remember About Antifreeze

Here are some key points to remember when working with antifreeze:

- Keep a specific antifreeze catch pan near each technician and label it appropriately
- Do not mix any other type of waste materials in the antifreeze catch pan or in the waste antifreeze container
- Protect and cover re-useable antifreeze (see Antifreeze Recycling)
- Discharging antifreeze into septic systems, dumpsters, floor drains or outdoors is illegal
- Label waste antifreeze containers clearly with "USED ANTIFREEZE" or "HAZARDOUS WASTE (ANTIFREEZE)"
- Label waste antifreeze containers with the date the drum first contained any hazardous antifreeze
- Recycling of antifreeze is very common and usually available locally

Antifreeze Recycling - Three Ways

did you know?

There are three ways to recycle antifreeze:

1. Off-site recycling services - Contract with a reputable company to remove your used antifreeze
2. Mobile recycling services - In some areas, a truck or van-mounted system can process used antifreeze
3. On-site recycling - Purchase or lease on-site recycling equipment; the sludge produced is a hazardous waste and must be disposed of using off-site recycling services, but it is minimal

Other Facts Regarding Antifreeze

Here is some additional important information about antifreeze:

- *Mixing antifreeze with other contaminants for recycling is considered a crime in some states and may lead to a prison sentence*; it will also turn the mixture into a hazardous waste or substance
- Pouring antifreeze into septic systems, dumpsters, floor drains or outdoors is illegal and easily traceable by EPA officials
- Mixing of used antifreeze and oil for the purpose of burning is not considered recycling and is an EPA violation
- Provide *quick containment* for in-shop spills to prevent antifreeze from entering the drains or septic tank systems
- Some states have *maximum amounts* of waste antifreeze that you may keep
- Some states allow a limited recycling time that starts with the original accumulation date, which is the date it was initially collected
- Some states do not allow shops to stack antifreeze containers more than two containers high

Summary

Antifreeze, especially used antifreeze, can wreak havoc on the environment. However, by simply following the guidelines for proper antifreeze disposal, collection, storage and recycling, you can easily minimize the damage antifreeze can do. If you have any questions about antifreeze, please ask your manager/supervisor.

Mechanical Pollution Prevention Floor Drains

Learning Objectives:

- Understand why floor drains are rapidly becoming extinct.
- Identify best practices related to floor drains and spilled

Floor Drains: A Thing of the Past

Floor drains are rapidly becoming extinct in the United States, due to the severe Environmental Protection Agency violations they can create for any automotive repair facility. They are not being included in new construction, and many shops are simply *plugging them up* to keep from inadvertently violating the law and creating environmental contamination problems.

Why Not Use Floor Drains?

Combine the fact that there are so many hazardous materials and hazardous wastes in an automotive repair facility, with the fact that many drains may be hooked directly to the ground water through septic systems and storm drains, and you will quickly realize that keeping a floor drain open is basically like inviting a regulatory disaster to occur in your shop!
If drains aren't covered, heavy metals from cars may be washed directly into ground water. Never put hazardous waste down the drain! At the very least, protect the drain from spills by either covering the floor drains or by using socks or sprayable dams.
Oils, grease, brake fluids, paints, thinners and particles can be contained, cleaned or collected in many environmentally friendly ways. There is no good reason for these materials going down the drain!

Tracking Back to the Source

By keeping shop floors cleaner than technicians have done in the past and using specific catch pans for fluids, a floor drain is not necessary. In the past, before floor drain laws existed, shops just washed things down the drain, unaware or unconcerned that they were negatively impacting the environment. Items such as oils, antifreeze, paints and thinners were washed into ground water.

keep in mind

Today, the EPA has developed highly effective methods to track the sources of pollution, and using drains for disposal no longer hides a mechanical shop's waste. Your shop can be easily identified as a contaminating source simply by discovering pollution and working the discovery process upstream to its source.

Alternatives (Continued)

Here are some more of the best practices to prevent hazardous materials or wastes from going down floor drains in the repair area:

- Use absorbent pads to collect floor wash water and wring out the pads into the appropriate waste container when saturated
- Check with the local sewer utility or city engineering department to verify whether your drains lead into septic systems, streams, lakes or drywells, all of which may contaminate ground water, and *let them know* if there are any potentially harmful fluids that could come from your shop's drainage
- Receive permission from your local sewer utility for floor cleaning wastes to enter the sanitary sewer system
- Do NOT sweep floor wash outside; the resulting contamination is the same as putting it into the septic system or water table

Alternatives

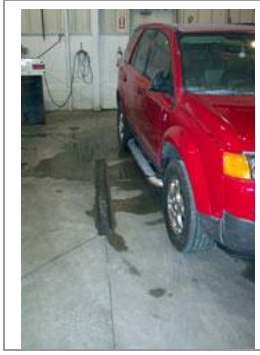
Here are some of the best practices to prevent hazardous materials or wastes from going down floor drains in the repair area:

- Catch leaks with drip pans before they become a spill, then dispose of the material in the appropriate waste container
- Clean small spills immediately with an absorbent
- Use a hydrophobic mop to clean up oil spills
- Reuse absorbent until absorbing properties are gone
- Dispose of absorbent as hazardous waste in its own hazardous waste container

Oil and Water Separators

Some areas require oil and water separators on floor drains. This special system reduces a great deal of potential contamination, but not all. Check with your local authority for appropriateness of use.

Car Wash Bay



Most auto mechanical shops wash the car when all repair work is completed. This is usually done with a high-pressure water spray. Many shops are separating the water used in this system from the drains or drainage area of the shop and more communities are recycling and minimizing car wash water. Car wash water compliance techniques are best handled by calling your local authority.

Other car wash tips include:

- Use biodegradable soaps and cleaning products
- Separate the water in this bay from other drains
- Use a recycling system that is practical

Summary

Like the dinosaur, floor drains may be fading off into ancient history, but that doesn't mean you won't ever have to deal with them. It's very important that you make sure you *don't let waste from your shop drain into the environment*. Take the proper precautions to clean up spills and cover or block drains when necessary. If you have any concerns with the proper ways to handle floor drains, please ask your manager/supervisor

Mechanical Pollution Prevention Absorbents and Spills

Learning Objectives:

- Recognize how to deal with a large spill.
- Understand how to deal with a chemical spill.
- Determine how to deal with an oil spill.

Introduction

Spills and leaks occur every day in auto repair facilities. Fortunately, most are very small. Many of these spills involve hazardous wastes that must be cleaned up correctly. It is important that everyone in the shop knows how to correctly and safely clean up both small and large spills.

Eliminating the spill is only part of the issue. *Understanding that materials used to clean up the spill may actually become hazardous waste and must be disposed of properly is also important.*

Spills - Drips and Drums

Spills come in all sizes, from a few drops on the floor to an uncapped drum accidentally being turned over. A large solvent or waste oil spill can undoubtedly be messy, but the mess is the least of the problems. Potentially, a large spill can be:

- An environmental threat, if it gets into drains
- A dangerous fire hazard
- Harmful to individuals, either by coming in contact with their skin or as a result of breathing noxious fumes

Proper cleanup is critical. Absorbents are used to soak up leaks and spills within your shop. You need to be aware that the absorbents *may be picking up hazardous materials* such as heavy metals, antifreeze, solvents or oil-based fluids that should not be thrown away or disposed of in landfills.

Used Absorbents = Hazardous Waste

Used or contaminated absorbents *must be treated as hazardous waste* and placed in containers marked "Used Absorbents - Hazardous Waste." The date of first use should also be on the container as well.

Do not mix different used absorbents. Used socks or dams for oil should not be mixed with antifreeze or solvent absorbents. Each should have its own specific labeled container.

Make sure the used absorbent container is in good shape and, as further protection, make sure the container has *secondary containment*, either a container within a container, or is positioned in a place that if leaks occur they would be captured and held from getting into any drains or into the rest of the shop. As a reminder, it is a good idea to check the containers for *corrosion and leaks* once a week.

General Handling of a Large Spill

If you have a large spill, follow these guidelines:

- Notify everyone in the area of the problem immediately
- If the material is *flammable*, get fire extinguishers immediately
- Call emergency authorities (usually your fire department) if the spill is dangerous or beyond your ability to clean up
- Prevent materials from going down the drain or outside onto the ground by using temporary dams, socks and/or drain covers
- If cleaning up the spill is within your capabilities, be sure to wear appropriate protective clothing, use absorbents and place used absorbent materials in appropriate containers
- Do a final wipe up with appropriate rags, and treat any rags that are soaked and dripping as hazardous materials as

Notifications on Larger Spills and Violations

Usually the fire department will guide you through appropriate actions, but you are also required by law to notify the Environmental Protection Agency if you have an environmental violation.

facts and stats

If a spill is *larger than 12 gallons or 100 pounds*, you need to notify the National Response Center at 800-424-8802. The National Response Center coordinates the handling of all major accidents and spills. They keep records of all large common spills, as well as uncommon incidents involving radiological (nuclear) and biological incidents.

Hazardous Waste Spills

Solvent spills are always considered hazardous, as are the absorbents used to clean them up, because they remain flammable after use.
Oil spills make the absorbents used for picking up the spill a hazardous waste even if the oil itself is not considered a hazardous waste. The reason is that oil absorbents may not be placed in landfills. Some oil absorbent materials like pads or socks may allow you to squeeze or drain most of the oil into a used oil container and may be reused, unlike solvent absorbents.
Antifreeze spills are usually not flammable. With antifreeze, however, the major concern is the antifreeze going into the drain or onto open ground. The absorbents used to clean up antifreeze should be treated as hazardous waste as well.

Smaller Spills

If the spill is bigger than what can be wiped up with three shop rags then you should consider using:

- Floor dry compounds which should then be recycled by an authorized recycler
- Hydrophobic mops

When the small spill is a gasoline or solvent, then use a dry absorbent and handle it as hazardous waste. If the spill can be cleaned up with three rags or less, then wring out the rags if you are picking up oil or antifreeze (into the used oil and antifreeze containers) and store the rags appropriately for recycling or cleaning.

Four Tips

Here are some ideas for dealing with small to medium spills:

1. If oil is present, use a hydrophobic mop. This mop primarily absorbs oil, not water or antifreeze. Do not use side to side motions to pick up the oil. A blotting method is best. Once collected, transfer the oil to your recycling container and you are done.
2. Antifreeze must be picked up using a cloth mop, at which point you can transfer it to your antifreeze recycling container.
3. Finalize cleanup by using rags, but do not let the rags become saturated. Send rags to an approved laundry or dispose of them properly.
4. Use a wet mop only if necessary for final cleanup. Before disposing of any cleanup water in the sink or drain, check with your local sewage agency first to find out about state and local regulations.

Summary

While this material may seem repetitive, spills and floor drain pollution are some of the most common EPA violations. Shops may believe that they are in compliance by disposing of their waste fluids properly, but then be fined by the EPA *because they do not dispose of their contaminated waste absorbents properly*.

It's important that you know how to handle small and large spills, as well as oil, paint and antifreeze spills. You also need to know how to handle used absorbents and how to dispose of them properly. Of course, you can find more related material in the "Floor Drains" course, but if you need any further assistance, please ask your manager/supervisor.

Mechanical Pollution Prevention Air Conditioning

Learning Objectives:

- Recognize the proper refrigerant recovery methods.
- Understand the laws related to releasing refrigerant.
- Determine who is allowed to perform air conditioning work.
- Identify refrigerant recovery equipment regulations.

Refrigerant

Refrigerant is a gas that has been used in the air conditioning system of vehicles for many years. Refrigerant is one chemical from a group of chemicals with a very long name: chlorofluorocarbons.

Chemicals that contain CFCs include:

- Other refrigerants
- Foaming agents
- Aerosol propellants
- Fire retardants
- Paint solvents

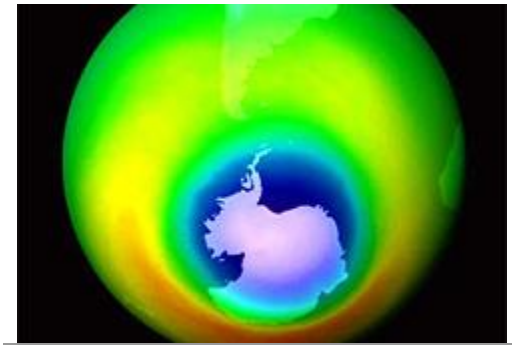
Body and mechanical shops used *refrigerant R-12*, an old version of refrigerant, but for a variety of reasons it is no longer used. The *current* and more common version of refrigerant is called *R-134a*.

The Affects of CFC Evaporation

In the 1970s, scientists found that the sun's ultraviolet rays were becoming stronger. Scientists know that one major contributor to skin cancer is ultraviolet rays from the sun, and skin cancer was increasing rapidly.

With the increased ultraviolet rays coming through our atmosphere, not only was skin cancer a worry, but other living things such as fish, animals, algae and ordinary bacteria were affected by increases in the sun's ultraviolet light. Most bacteria, both good and bad, die when exposed to high levels of ultraviolet light.

The Ozone Layer



For years scientists could not explain why ultraviolet rays were increasing. In the 1980s, however, refrigerant and other CFC-based products were found to be part of the problem. CFCs, when released, evaporate and go high into the atmosphere. They combine chemically with the ozone layer of the earth's atmosphere. This thin protective layer of ozone is the primary reflector and filter of the sun's ultraviolet rays.

When CFCs reach the ozone layer, they chemically interact and the ozone layer becomes thinner. With more CFCs evaporating skyward, significantly more ultraviolet rays are reaching earth. *Actual holes, where no ozone exists at all, have formed and are increasing in size.*

Countries Meet on CFCs

Thinning of the ozone layer caused scientists and representatives from all over the world to come together to work at solving the problem. In 1987, representatives from a number of countries met in Montreal, Canada to develop agreements to reduce the amount of refrigerant and CFCs being used and released. The outcome of that meeting is now known as the Montreal Protocol. By March 31, 1996, 155 countries had agreed to the Montreal Protocol. The results of the Montreal Protocol have affected every person working on vehicle or home air conditioning in the United States and most of the countries of the world. More importantly, the results of changing from CFCs to less dangerous materials make life better for every living thing.

Room for Improvement

And so, it was out with the old: refrigerant R-12:

- The Clean Air Act ended all production of refrigerant R-12 as of January 1, 1996. There are still many vehicles driving around that have refrigerant R-12 in their systems, however.

And in with the new: refrigerant R-134a and beyond:

- The most common refrigerant around today is R-134a, although manufacturers are considering and using other refrigerants as well. There are aftermarket conversion methods for older vehicles with R-12 and replacements for R-134a arriving that seem to have much less CFC content.

Significant New Alternatives Policy

In 1994, the Environmental Protection Agency established the *SNAP Program* to review alternatives to ozone-depleting substances like CFC-12. Under the authority of the 1990 Clean Air Act, the EPA examines new substitutes for their ozone-depleting, global warming, flammability and toxicity characteristics.

keep in mind

The EPA has determined that several refrigerants are acceptable for use as CFC-12 replacements in motor vehicle air conditioning systems, subject to certain use conditions. In order to view an updated list of approved refrigerants online, click on the following link: www.epa.gov/ozone/snap/refrigerants/lists/mvacs.html.

It's a Crime to Release CFCs

The United States has taken the release of CFCs by the automotive industry very seriously. Since 1992, releasing refrigerant R-12 into the atmosphere has been a criminal offense. All CFC, HCFC and HFC refrigerants need to be recovered and should never be released into the atmosphere. Additionally, you must now be certified to work on air conditioning equipment.

Certified Technicians and Motor Vehicle Air Conditioning

Only certified technicians should be allowed to work on air conditioning systems.

Section 609 of the Clean Air Act mandates that *only technicians trained and certified by a program that conforms to the Act* may work on refrigerant-based MVAC. If a *non-certified technician* works on the air conditioning system it is a *violation of the law*. Certified technicians should:

- Carry their certification card when working
- The shop should keep their certification statement or certificate on file on site

Click here for a list of EPA-approved Section 609 Training

What Should be Done?

Keep in mind the following points when dealing with refrigerants:

- Allow only certified technicians to work on air conditioning disassembly, reassembly and recharge
- Recover and recycle refrigerant, using *EPA-approved equipment*
- If your equipment is recovery only, you must have any refrigerant that is removed from the vehicle taken by an EPA-approved recycling company
- Keep records of the dates and quantities of refrigerant recovered and recycled
- Filters from approved refrigerant equipment must be treated as *hazardous waste*

Equipment Certification and Regulation

If you choose to recycle, the recycle and recovery equipment must *meet or exceed* Society of Automotive Engineers standards established for either machine. If your shop uses recovery-only equipment, it must meet SAE J-2209 standards while recovery/recycling equipment must meet SAE J-1990 standards. *Do not use home-built, non-approved equipment* to recycle refrigerants!

Always keep hoses in good condition and only replace hoses on the vehicle or your equipment with the correct type.

Additionally, your facility must notify the EPA that you *own, lease or use* approved refrigerant recovery or recycling equipment. You need only do this one time. Additional recycling equipment or updates of approved equipment do not require notification.

Summary

Refrigerants can do significant damage to the atmosphere, and the ozone layer in particular. Thankfully, the governments of the world are aware of this and are working hard to regulate the production of CFCs worldwide.

You can do your part by making sure that *no R-12 is released by your shop into the atmosphere*. Recovery and recycling of all types of refrigerant using the proper certified equipment is essential. If you have any questions about how to handle refrigerant, please ask your manager or supervisor

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Mechanical Pollution Prevention Batteries

Learning Objectives:

- Understand proper handling of damaged and used batteries.
- Recognize proper storage of damaged and used batteries.

Used Batteries

- Unusable lead acid batteries are a hazardous waste. However, used batteries are recyclable. Batteries should only be removed from the premises by a licensed battery hauler for recycling. If you are unsure of who to contact to begin recycling your batteries, you may want to try your battery supplier first, since many battery suppliers provide recycling services as a part of their business.

did you know?

Throwing spent batteries in the dumpster or having them removed by an unlicensed battery hauler is a violation of the law.

Damaged Battery Handling

Some cars that you come into contact with in a mechanical shop may have damaged batteries.These damaged batteries should be immediately placed in an acid-resistant container or tub.

Leftover battery acid may be neutralized using large quantities of baking soda or a neutralizing agent supplied by the battery vendor. Some vendors supply special containers for broken and leaking batteries for transport.

Never put damaged or leaking batteries outside or on metal trays for short-term storage.

Things to Consider

Keep the following points in mind when handling batteries:

- Wear safety glasses and acid-resistant gloves when handling batteries, because they can explode or leak
- Store batteries on sturdy, acid-resistant shelves, no more than one high
- Do not stack batteries on top of each other, because leaks are harder to find when the batteries are stacked; acid can drip down onto the lower batteries
- When using wooden pallets, place the pallets on impermeable slabs
- Store batteries in a covered and secure location
- Store damaged batteries in a tub or pan so any leaks will be contained and not leak into drains or outside

Battery Recyclers

Never put a damaged battery in a dumpster. This is a violation of environmental laws. Recyclers are happy to take the remnants of the battery at no cost or low cost because of the value in the lead.

Specific Information for Your Area

Lead acid batteries are banned from municipal solid waste disposal facilities. Retailers must take back used batteries.

Summary

If you are still unsure about how to handle and store damaged and used batteries, please refer back to the course material. Be careful and wear the necessary personal protective equipment whenever you handle batteries, especially damaged ones. Finally, remember to recycle used batteries.

Mechanical Pollution Prevention Asbestos

Learning Objectives:

- Understand what asbestos is and how it is used.
- Know where to access OSHA and EPA information on the subject

Asbestos - What It Is and How It Is Used

OSHA Standard and Information

OSHA's asbestos standard requires the use of controls and safe work practices when employees work with brake shoes and clutches that contain asbestos. These requirements are detailed in 29 CFR 1910.1001 and specifically 1910.1001(f)(3) and Appendix F of the standard - Work Practices and Engineering Controls for Automotive Brake and Clutch Inspection, Disassembly, Repair and Assembly (http://www.osha.gov/SLTC/asbestos/index.html). The requirements also are discussed in the Federal Register at 59 FR 40964, 40985-87 (August 10, 1994) and 60 FR 33983 (June 29, 1995), as well as in OSHA Directive CPL 2-2.63 (revised).

On July 26, 2006, OSHA issued a Safety and Health Information Bulletin to inform employees and employers in the automotive brake repair industry of the precautions that must be taken when working with automotive brakes and clutches containing asbestos. Click here to see this bulletin

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"Asbestos" is the name given to a number of naturally occurring, fibrous silicate minerals mined for their useful properties such as thermal insulation, chemical and thermal stability, and high tensile strength. Asbestos has been used as an acoustic insulator, and in thermal insulation, fire proofing and other building materials. In addition, asbestos has previously been used in automobiles for brake linings and clutch facings, also known as "friction materials."

OSHA Regulations - Disposal

Employers of professional automotive technicians must ensure that they or their waste haulers dispose of waste that contains brake or clutch dust, including wet rags used to wipe this dust, in accordance with Federal and local regulations, including the OSHA asbestos waste disposal regulations.

OSHA regulations (29 CFR 1910.1001(k)(6) and 29 CFR 1910.1001(j)(4)) require that, before waste containers with brake and clutch dust and other asbestos waste in them are collected, they must be sealed. The containers also must be impermeable and must be appropriately labeled

OSHA Regulations - Personal Protective Equipment

OSHA regulations (29 CFR 1910.1001) list the required Personal Protective Equipment (PPE) that must be used when working with asbestos-containing materials. These include:

- Respiratory protection
- Protective work clothing, including gloves
- Face shields, vented goggles

The regulations also address the laundering of contaminated clothing so as to prevent the release of airborne fibers of asbestos in excess of the permissible exposure limits.

EPA Information

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On April 2, 2007, EPA released its publication entitled "Current Best Practices for Preventing Asbestos Exposure Among Brake and Clutch Repair Workers." The brochure is intended to provide information for automotive professionals and home mechanics on preventing exposure to brake and clutch dust that may contain asbestos fibers. To view the document, click here.

Summary

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Please refer to the documents and regulations from OSHA and EPA referenced throughout this module for additional information.

Because this module is based on regulatory agency documents and regulations, there is no Quiz to be completed before you proceed to the next module. Material presented in this module will not be covered in the Mechanical Pollution Prevention Final Exam.

Mechanical Pollution Prevention Tires

Learning Objectives:

- Understand the benefits of tire recycling.
- Recognize the problems of stacking or illegally dumping
- **Used Tires**
  -
- Although not *currently* mandatory everywhere in the United States, tire recycling is gaining momentum worldwide. Check with your *state solid waste program* for more information regarding tire disposal in your particular state. Click here for additional state information.

facts and stats

Tires, by their nature, do not lend themselves to good landfill practices. In fact, tracts of land covered with piles of tires are now known as tire farms. Would you believe that each year over *275 million tires are scrapped in the United States alone*? One global tire recycler reports that five million tires are disposed of daily!

Tire Pollution Hazards

In addition to being unsightly, tires that are piled, stacked or dumped illegally may lead to:

- Retained water that is a breeding ground for mosquitoes
- Accelerated breeding of mice and rats
- Dangerous burn areas that, once ignited, emit *dangerous toxic fumes and are nearly impossible to put out*

Recycling

The recycling process can be accomplished in several ways. Some tire recyclers will retread tires to recycle them. In addition, recycling tires has advanced to the point that there are some recyclers actually grinding the old tire material to a near dust which can be used in:

- New tires
- Road repaving
- Burned with coal at very low emissions levels as an energy source

In some areas you may find that recycling of tires is mandatory! Check with your state or local environmental agency office for more information.

When handling tires, do not forget that *most wheel and tire assemblies are balanced using lead weights. Always remove the lead weights* and keep them segregated from other metals. Most battery recyclers are happy to recycle your weights by melting them down for use in another form.

Recycling should also be a consideration for damaged aluminum and magnesium wheels.

Summary

The bottom line is that tires must be recycled. Tires that are piled, stacked or dumped illegally can lead to a variety of hazards that can affect your employees and the environment. If you need help with recycling, you can always call 1-877-EARTH911.

Mechanical Pollution Prevention Other Sources

Learning Objectives:

- Understand proper management of rags, solvents, sheet metal, parts stored outside and plastic pieces.
- Recognize the regulations concerning catalytic converters.
- Identify other sources that affect a shop's environmental

Introduction

In previous modules of this course, we've discussed the more significant potential causes of pollution in an automotive repair facility. There are, however, a few less significant ones that need to be addressed as well. We will also cover some additional methods to help you stay in compliance, with some additional tips thrown in for good measure.

Rags

You will find the two classifications of rags below:

- **Hazardous** - Rags or wipes that you do not reuse or are solvent-contaminated may be considered hazardous waste. Rags or wipes are also hazardous waste if they have a hazardous characteristic such as ignitability or toxicity.
- **Non-Hazardous** - If you are able to reuse or recycle your solvent-contaminated rags or wipes, they are usually not considered a solid or hazardous waste - provided that they are *managed in an environmentally safe manner*.

Managing Contaminated Rags

Here are some suggestions for how to deal with contaminated rags and wipes:

- Wipes that are recyclable should not be dripping when they are put in storage containers
- Store rags in a container that says "Used Solvent Rags Only"
- Do not place materials contaminated with different solvents into the same container
- Do not put other waste in a container of solvent contaminated rags or wipes
- Handle solvent-contaminated rags or wipes using a legitimate management practice such as a professional laundering/dry cleaning service

Usually no license or manifest is needed for transporting your rags or removing the solvents if this activity is done at either your shop or at the laundry/dry cleaning facility where the rags or wipes are taken for cleaning.

Rags are not recommended for landfills, and are most often professionally burned for energy recovery if they cannot be cleaned.

Solvents

Used solvents must be handled properly after use for wipe down, parts cleaning or in other ways.
Note that if you are using halogenated solvents (greater than 5 percent concentration of methylene chloride, perchloroethylene, trichlorothylene, trichloroethane, chloroform or carbon tetrachloride) to clean parts or equipment, you must file a notification with the Environmental Protection Agency. If you are not sure about whether you are or are not using halogenated solvents, check the Material Safety Data Sheet for the product in question.
If you know or believe you are using halogenated solvents in your shop, you should check CCAR's Web site to find out about special rules that will apply to your shop. If you are not using the halogenated solvent, these rules will not apply.

Handling Solvent

Here are some ways to make sure you handle solvent in the proper way:

- Used solvent must be treated as hazardous waste, unless it is used in a still, a paint gun wash machine or another parts/equipment wash machine
- Solvent cans and solvent sink lids should be closed at all times except when being used
- Used solvent must be kept in separate containers that specifically state the name of that solvent and are also labeled "Used Solvent"
- Containers should be checked for leaks and damage at least once a week
- Disposal of used solvent should be handled by certified recyclers and disposal companies only
- Used solvent should never be poured in drains, poured outside or thrown away in dumpsters

Remember to keep the proper manifests and paperwork from your solvent recycler or hazardous waste transporter in your environmental file with all other paperwork.

Catalytic Converters

Catalytic converters help reduce the engine's tailpipe emissions of unburned hydrocarbons and carbon monoxide. Mechanical shops often do not recognize some important issues concerning the converter:

- The shop must replace a vehicle's catalytic converter based on that specific vehicle's requirements in order to comply with EPA regulations
- Used or non-functioning catalytic converters must be kept by the repairer for 15 days after removal from the car and tagged with the car make, date of removal and repair order number
- Installers are prohibited from installing aftermarket catalytic converters on vehicles still covered under the vehicle manufacturer's emission control warranty
- Catalytic converters are easily recycled due to the rare metals they contain, and recyclers often pay shops for their used or non-functioning catalytic converters
- Customer work invoices, statements and warranties for catalytic converter replacement must be kept for a minimum of six months

Underground and Above Ground Storage Tanks

Mechanical shops generally do not have storage tanks on site unless they heat with oil.

The EPA has very stringent and specific laws regarding leaks in underground storage tanks. Should you have concerns regarding tanks in the ground or regarding a possible leak with an existing underground or above ground tank, please refer to the Virtual Auto Service Shop and the two sections entitled "Underground Storage Tanks" and "Storage Tanks" for standards and solutions.

Mercury

Mercury is a metal which is found in a liquid state at room temperature. All most people know about mercury is that it is most commonly recognizable as the silver metal inside glass thermometers.

Mercury is also, however, a nerve toxin that can be very damaging to our health. It can impair the way we see, hear, walk and talk. When mercury is deposited in lakes or waterways, bacteria ingest it and convert it to methyl mercury. Methyl mercury contaminates the food chain and builds up in the tissue of fish and of wildlife and humans who eat the fish or wildlife. Because of high mercury concentrations in the fish, several Great Lakes states issue advisories each year cautioning people to limit how much fish they eat.

Mercury (Continued)

Common items that are around shops and vehicles that have mercury are:

- Lamps/bulbs - Mercury vapor lamps, fluorescent lamps, metal halide lamps, high pressure sodium lamps, neon lamps
- High intensity headlamps
- Anti-lock braking system switches
- Some types of instrument panel light bulbs
- Convenience lighting switches
- Back-lit instruments
- Family entertainment system
- Navigational display
- Hood light switch

Fluorescent lamps are the second largest source (after batteries) of mercury contamination. It is estimated that *over one billion* lamps and bulbs such as fluorescent, mercury vapor, high pressure sodium and metal halide are discarded every year.

Check out CCAR's Web site for more information on mercury.

Mercury Product Solutions

When you remove switches from appliances or vehicles, store them in a covered container marked "Mercury Switches for Recycling." In some municipalities there are consolidation sites, which take the switches for free and mine the mercury out for reuse. Some areas have transporters who will take them away for a fee.

Supervisors and staff in charge of your shop's environment can contact a county or state environmental office or solid waste office for recycling services available in your area. For recycling purposes, make sure that the shop retains the invoices that track your waste. Include the following information:

- Date of shipment
- Amount of waste
- Location from where the wastes are being shipped
- Destination of the shipment

Dealing with Fluorescent Lamps

Fluorescent and HID lighting is an excellent business and environmental choice because it can use up to 50 percent less electricity than incandescent lighting. However, used fluorescent and HID lamps must be managed properly because they contain mercury, usually in a modified form (powder).

- Store used lamps in an area and in a way that will prevent them from breaking, such as in boxes the lamps came in or boxes supplied by lamp recyclers
- Mark the lamp storage area with the words "Fluorescent lamps for recycling"
- Do not break or crush lamps because mercury powder may be released
- If lamps are accidentally broken, store them in a sealed and labeled container marked "Hazardous Waste - Broken Mercury Lamps"; use gloves to pick up spilled mercury powder and add it to the sealed container
- Take lamps to a consolidation site or arrange with a lamp transporter to pick them up and contact your county or state environmental office or solid waste office for services available in your area; save the invoices that track your lamps and include the following information:
    - Date of shipment
    - Number of lamps
    - Location from where the lamps are being shipped
    - Destination of the shipment

Outside Storage of Parts

Mechanical parts that you take off a car are often set outside, out of the way. However, when it rains and the parts are not covered, or they are leaking, the runoff or leakage becomes an obvious waste and pollutant. The runoff can leach into the soil and groundwater.

It is best to store parts inside, but if you do store parts outside, it is best to keep them *under tarps or wrapped* to stay in compliance. Never let parts that could leak, such as *brake master cylinders, batteries or gas tanks*, be stored outside.

Sheet Metal and Plastic Components

Sheet metal waste is not hazardous, but is an eyesore and should be protected from view of the public behind sight barriers. The public does not know that sheet metal is not hazardous, but does tend to label the auto industry as a polluter, partially because of what they see in sheet metal storage at poorly maintained facilities.

Sheet metal need not be a problem. Contact your national or state auto association for metal recycling vendors.

Some shops repair and recycle the front bumper cover. In the future, most of the plastic components of a car will be identified as to the type of plastic (polypropylene, polyurethane or reinforced composite) it is made of and will be more recyclable.

To make recycling easier and more convenient, shops should separate their recyclable material into groups, such as plastics, metals, aluminum and other groupings.

Recycling Salvage Vehicles

facts and stats

According to one auto manufacturer, the recyclable items in a vehicle are, by weight:

Engine, transmission, tires, battery and catalytic converter	50 to 55 percent
Body of steel and non-ferrous metals	20 to 35 percent
Plastics and other materials	1 to 25 percent

Cardboard and Paper Materials

Look in the dumpster of any automotive repair facility and you will see an abundance of cardboard and paper that could be recycled. In other countries, particularly European countries and Japan, recycling and gaining additional use of paper products is done much more frequently than in the United States.

Some shops are starting to segregate their paper products. A few shops have purchased industrial-sized trash compactors and compress their paper products, which results in lower disposal costs, in addition to taking up less space. Another public relations benefit is that it also allows the shop to market their environmental commitment to consumers.

Cardboard and paper are not a hazardous waste, but they do make up a waste stream that has possibilities beyond that of being sent to your local landfill.

Summary

The proper management of rags, solvent, sheet metal, parts stored outside and plastic components, as well as an understanding of the regulations concerning catalytic converters and other potential pollutants, all have an impact on a shop's environmental compliance. With all of these items, remember that recycling is a key concept. Recycling allows you to dispose of items responsibly.

If you would like more information on any of the topics covered in this course, or have more specific questions that need to be addressed, check out the CCAR Home Page.